Why Standard Time is better

We have to stop changing the clocks twice a year, but it’s also important to pick the right schedule when we do it.

Thousands of scientists say that Standard Time is better, yet legislators are pushing for permanent DST, anyway. The scientists have shown that seeing light in the morning is essential to health, and without it we get more cancer, diabetes, and obesity.

We need to balance the needs of night owls and early birds to have a good outcome for everyone.

Changing the clocks

Around the world, voters have chosen to end the clock changes twice a year. California, Oregon, Florida, and the entire EU have begun doing away with the time change. Public health is one of the reasons: switching twice per year results in more accidents and heart attacks afterwards. But what if our health still depends on the clock throughout the entire year? Some schedules are better than others, and setting our clocks in a way that makes us sleep less year-round would be bad for our health.

The question is: which schedule should we choose? Legislators in several places around the world appear to favor permanent “daylight time”, but this schedule is associated with more cancer, diabetes, and
obesity. There’s a simple reason: for most of us, waking up in the dark is tough on our internal clocks and our sleep.

The consequences of this kind of sleep and light disruption are very serious. Shift work can raise the lifetime risk of cancer by 70%. Messing with the clock in smaller amounts matters too: the best numbers say making people wake up an hour earlier could give us 10–20% more cancer. That’s a huge disconnect between science and policy that’s trying to improve public health.

Thousands of scientists have posted their statements online, so we’ve made a list of these statements all in one place, so you can read them. We’re also trying to explain the evidence behind them, with the hope that this important research will become part of the public discussion.

**Thousands of circadian scientists support standard time**

The two largest groups of scientists researching circadian rhythms have issued statements with a strong preference for standard time.

**Why Should We Abolish Daylight Saving Time?**

“‘The authors take the position that, based on comparisons of large populations living in DST or ST or on western versus eastern edges of time zones, the advantages of permanent ST outweigh switching to DST annually or permanently.”

_Till Roenneberg, Anna Wirz-Justice, Debra J. Skene, Sonia Ancolli-Israel, Kenneth P. Wright, Derk-Jan Dijk, Phyllis Zee, Michael R. Gorman, Eva C. Winnebeck, Elizabeth B. Klerman_

**Read the SRBR statement (representing more than 1,000 scientists in the United States and worldwide)**

“We emphasize that the scientific evidence presently available indicates that installing perennial Standard Time (ST, or ‘wintertime’) is the best and safest option for public health…ST will be healthier than DST in terms of sleep, cardiac function, weight, cancer risk, and alcohol and tobacco consumption”
SRBR Contacts: Céline Vetter, Public Outreach chair; Erik Herzog, President

Read the EBRS statement (the largest research society in Europe)

“[Standard Time] improves our sleep and will be healthier for our heart and our weight. The incidence of cancer will decrease in addition to alcohol and tobacco consumption. People will be psychologically healthier and performance at school and work will improve”

EBRS Contacts: Debra Skene, President; Martha Merrow, Vice-President

Time to change, but only to ‘wintertime’, Meijer and Foster

The main way in which biological time is set to the geographical time is by exposure to light—primarily in the morning. Without this ‘light-kick’ in the morning, our biological clock drifts and our bodies are no longer able to perform according to the demands of the time of day. This holds not only for teenagers, who are known to possess “slow clocks”, but really for everyone.

Who wants to go to work in the dark? Californians need Permanent Standard Time

Humans require adequate morning light so that our internal biological rhythms synchronize properly to the local time. There’s a wealth of data demonstrating that a lack of exposure to light leads to sleep and metabolic disorders, depression and cardiovascular disease, among other ailments.

— UCLA Chancellor Gene Block and Johanna Meijer

Is year-round daylight saving time a good idea? Maybe not

Permanent daylight saving time wouldn’t solve this issue; instead, it would prolong it—adding more days of social jet lag to the year.

— Steve Kay and Travis Longcore (USC, interview by Joanna Clay)

Early to bed, Early to rise?
Let's imagine we took this too far and asked everyone to wake up super-early, at 3AM.

You'd probably wake up groggy and tired the next day. But maybe that's fine—why not go to bed at 7PM to feel better? Wouldn't we all get used to it? Lots of people think that their body's internal clock moves based on when they sleep, so they say, maybe you can get used to any schedule.

It doesn't actually work this way. Instead, your internal clock sets itself based on when you see bright light. People trying to sleep at 7PM couldn't fall asleep (their clock would be saying, It's Daytime!) because they wouldn't be tired yet. They also wouldn't find it very easy to wake up at 3AM in the dark—their clock would say they should still be asleep. Nighttime!

As you probably guessed, even if we kept this up for years, most people wouldn't get used to this schedule, because the timing of the light is all wrong. They wouldn't see enough light in their “morning” at 3AM, and they'd see too much of it right before bed. We know that the human body won't fall asleep at certain “internal” times of day due to work done by Steven Strogatz and colleagues at Harvard in the 1980s—there is a region just before bed when you can't fall asleep, and another one like this just after you wake up. We have to align our sleep with the light we see.

And of course it doesn't make any difference if we move the clocks so that 3AM is called 7AM—you can't fool the body's clock. It's the internal clock that matters, and that clock mostly cares about when the sun is up.

There is a “best” time for each person to sleep relative to daytime, some of them early, others pretty late, and when we look across a population, there is a complicated way to pick the “best” time for everyone. We think it should be the schedule that, on average, lets everyone sleep a little better, have less cancer and lower weight, feel less irritable, and have fewer auto accidents. For most places (including California, Florida, and Europe), the science is clear. The right answer is closer to year-round “standard time” than it is to “daylight” time.

Does an hour matter?
Everyone would notice if they missed out on four hours of sleep like our exaggerated example, but a lot of people don’t notice when they get just a little less sleep. Sleeping a half hour less actually does make a big difference for your health over time, but it’s hard to tell when you’re just a little off from your best schedule—you might start to feel burned out, hungry, or irritable. Over time, these small bits of sleep loss add up into large effects on our health. When scientists study sleep in larger populations, they can see these effects fast.

With “permanent DST” as proposed in California and in other places throughout Europe, we have to set our alarm clocks an hour earlier all year, so solar noon happens at 1 PM. And through the whole winter, we’d get up in the dark. This one-hour change has a big effect on our health, and a lot of it is due to how we feel in the wintertime.

**Daylight vs. Morning Light**

Daylight Time sounds good (since it makes some people think of “permanent summer” or even “more light”), but it’s really not that good. Changing the clocks this way does not give us more light during the winter, and it comes at a steep cost, which is that our mornings are a lot worse. We have to set our alarm clocks earlier, waking up in hours of darkness and going to work earlier.

Your circadian clock sets its time by when the sun is up, and the morning is especially important. Without light in the morning (and there’s a lot less light in the winter), your clock will get later and later, waiting for bright light to tell it that it’s daytime. When your clock is set much later than the alarm clock, you have trouble falling asleep at night and trouble waking up in the morning. This makes us lose sleep, and this has serious effects on physical and mental health.

Extra light at night doesn’t help—it only tells your clock: *Stay up later!*

**We already tried DST all year long: 1974’s Energy Crunch, and Russia’s Traffic Accidents**

In 1974, the United States decided to try permanent DST for two years, in order to save energy. At first, people were optimistic (79% were in favor of the move), but by February, after the first winter, support had
dropped to 42%. Remember, the winters are tough. The US in 1974
didn't make it the full two years: Congress rolled back the measure in a
383-to-16 vote.

In 2011, Russia tried changing to DST all over the country. Again, the
measure was initially very popular, but within a year, traffic accidents
had gone up and the measure was unpopular. They reversed the
decision in 2014, and they now use standard time.

It's important to remember that initial enthusiasm for year-round DST
does not mean that we’ve felt like to go through a winter
without light in the morning.

**Cancer Rates**

In 2017, a group of cancer epidemiologists at NIH and Harvard looked
at **four million** cancer diagnoses in 607 counties across the United
States. They noticed that some people live on the eastern side of a
timezone (where the sun rises a whole hour earlier), and others on the
western side. They were able to see how cancer rates change by when
the sun rises.

When the sun comes up later, cancer rates go up a *lot*.

*In men, twenty minutes of later sunrise gives 9% more stomach cancer,*
*11% more liver cancer, 4% more prostate cancer, and 13% more leukemia.*

*In women, the same twenty minutes gives 3.7% more breast cancer,*
*16% more esophageal cancer, 4.5% more colorectal cancer, 4.6% more*
*lung cancer, and 10% more uterine cancer.*

Remember that we’re wondering what happens when we shift our
clocks earlier by a full hour? These statistics are for only twenty
minutes. We don't have to try it to know what will happen—getting up
earlier all year (for “daylight time”) is not a good plan for keeping
cancer rates low.

**Social Jetlag and Obesity**

One of the most influential groups working on the subject of how well
people align with solar time is Till Roenneberg, Martha Merrow, and
their colleagues at LMU in Germany. They have surveyed more than 250,000 people about their sleeping patterns. By asking people how much they sleep in when they don’t have to set their alarm clocks, they can estimate how much sleep loss there is on the other days. This research on “social jetlag” gives us a way to see when people are in the wrong timezone for their bodies. If you wake up with an alarm clock, this includes you.

In 2007, Kantermann and Roenneberg used the social jetlag model to understand how DST affects a group of 55,000 people. They showed that the change to standard time in the fall (when we get to sleep in) is quite easy, and the change in the spring (when we go to DST and wake up earlier) causes most of the problems. Night owls especially have trouble in the spring.

This means that people do not get “used to” the sleep restriction they experience when clocks are set earlier. They sleep less. According to their data, Standard Time lets people sleep more and reduces social jetlag.

In 2012, Roenneberg’s team also showed that those with more social jetlag from sleeping at the wrong time tend to be more obese, even when they sleep the same number of hours.

“Overall, our results indicate that sleep timing is an equally important predictor for BMI as is sleep duration.”

This means that a person who sleeps 8 hours a night, but at the wrong time, can still have poor sleep.

**Type 2 Diabetes**

Eve van Cauter’s group at University of Chicago demonstrated some of the important ways that sleep debt affects our waistlines. They asked people to sleep less, and then showed that they had decreased glucose tolerance and insulin sensitivity. These healthy people were responding as if they were pre-diabetic. When their sleep was restricted, people would also eat more the next day.
From Jacqueline Lane and colleagues at Mass General Hospital, we learned that about a quarter of the population has a gene that predisposes them to Type 2 Diabetes, but only when they wake up early. When allowed to sleep past 7 AM, these people have a normal risk, and when woken up early, they have an 80% higher rate of diabetes. This group simply needs more sleep, and changing the clocks by an hour is no good for them.

**Seasonal depression and morning light**

In places where the sun rises late in the winter (including northern California), rates of SAD, or seasonal depression, go up. Around 10% of people have winter depression in places like Seattle, and nearly 25% in Alaska. A majority of this group can feel better using bright light therapy (light boxes), a treatment which works best in the morning.

For people at risk of SAD, waking up earlier in the winter is the wrong idea. With our clocks set to DST in the winter, San Francisco would have its sunrise at 8:30 in the wintertime, a half-hour *later* than Seattle does today, at 8:00.

It is best if people can see some daylight in the morning, and some in the evening. But if we’re going to see more natural light at one time or the other (spending most of our hours indoors), *we should prefer light in the morning*. When we treat depression with bright light, it is more effective when used in the morning than at any other time of day.

There’s a second reason to prefer natural light in the morning. People are spending less time outside, and electric lighting is only getting brighter at night, as are our devices, so the trend is that we’re “making” more night owls every day, by adding more light at night year by year.

It doesn’t take that much, since just moving to a new house with brighter lighting, replacing your old lights with more efficient ones, or getting a new phone with a brighter screen can give you a larger dose of evening light. Most people don’t see electric light before they wake up, but they do see it when they stay up too late. Because of this trend, we need to make sure we have enough morning light to balance out the light we’ve added to the homes and devices at night.

**Early Birds vs. Night Owls**
We could imagine a schedule that made everyone stay up really late and then let us all sleep in. Under this schedule, the night owls would be very happy, because they could stay in bed as long as they needed to. But what would happen to the early birds? They’d try to go to a late dinner party, and they’d have trouble staying awake. We could pick a schedule that makes one group or the other feel very uncomfortable. The goal is to pick the equitable “middle” that works pretty well for everyone.

This brings us to perhaps the central (and unspoken) issue in the debate: **should we do what’s right for early birds or for night owls?** It is true that early birds can get up, easily, before the sunrise each day, and also that we tend to wake up earlier as we age. It’s reasonable to explain the current debate as a balancing of interests. Favoring the early birds (say, those over 50), ignores the needs of younger people, and can even make night owls ill. How do we pick the solution that balances these needs?

In California, our average Assembly person is 51, and the numbers say this person tends to be an early type, able to wake up several hours before someone in their 20s. Making the political question more confusing, 60 year olds vote at twice the rate of 25 year olds. So a majority of the input from voters and legislators includes people who can wake up early without much trouble.

There is a gap between people in their 20s and 30s and people later in life. If you’re early in your career, you might have a boss that wakes up three hours earlier than you do, and that’s normal. But to fix this, we **should try to pick the middle of this distribution**, not go overboard in one direction or another. We think the public health data suggest that **standard time is indeed the balance**, not daylight savings time, or a schedule where we sleep in for hours that makes the early birds feel like they’re the ones being treated unfairly.

**For hundreds of years, noon was the time when the sun was directly overhead**, and a lot of our social conventions are still based on this clock. Social clocks change extremely slowly—we still decide “when” to do things based on when people worked outdoors. Because social conventions move so slowly, we should not expect people to change their working hours overnight if we get the clocks wrong. That could take decades or longer.
It's very hard to translate anecdotes about long summer nights, or waiting for a bus in the dark, into data about how well people are sleeping. There are lots of happy people who are not complaining. Also, even if 25 year olds turn out to vote at half the rate of 60 year olds, we do need to consider them, anyway.

This is why we need to rely on the public health data and the research that says letting people sleep a little bit later would be better, for most people. The early birds would still get up pretty early, but no earlier than they have for hundreds of years.

**Sports and Health**

Athletic activity is important for health and fitness, so some people say that sports after school are what they care about the most. People deserve to have light to do the activities they want to do. There are some people saying that more time for sports means we need to adopt permanent DST. Since athletics is good for our health, well, doing more of it late at night is great, right? Maybe it’s not that simple.

Let’s remember that DST during the winter is not something we have today, so we’re talking about whether or not kids should play an extra hour of sports during the winter, until 6PM instead of 5PM, without having to turn on any stadium lights. So in some places, we have kids waking up before 6AM to get ready for the bus, and they’re still on the field 12 hours later. These same kids need 9–10 hours of sleep.

One thing you might not know is that professional sports teams have been some of the early adopters of sleep and circadian research, enlisting the best research advice, planning practices to minimize injuries, scheduling travel to minimize jetlag. And lots of pros are stepping up to say how sleeping well (and a lot) is the key to performance and recovery.

We also know that sleep and exercise are closely related. First, **tired people don’t exercise nearly as much, so anything that restricts sleep will make you do less activity.** Next, **exercising right before bed can disrupt your sleep,** so you should do it a little earlier in the day. And finally, **sports injuries go up considerably when sleep is restricted.**
A study of 112 adolescents shows that *sleeping less than eight hours per night increases the risk of injury by 70%*. Since sleeping 8 hours or more is protective of these kids, and because it makes people exercise more on their own, we should not encourage sports to the exclusion of sleep—that’s too much. That extra hour of sleep (and time for studying) is important. This is why pro athletes love this new science—it improves their performance and keeps them from getting hurt.

There is time for sports, but we need to balance it with sleep.

**Confusion at the ballot box**

As we’ve seen with news and social media, how an issue is framed can divide a group of people who might otherwise agree.

In November, voters in California passed Proposition 7. What you might not know is that the text on the ballot and the voter guide almost avoided mentioning permanent DST. Here’s the voter guide:

‘*Establishes the time zone designated by federal law as “Pacific standard time” as the standard time within California.*’ It’s only later in the description, the sponsor notes that the Legislature might vote for permanent DST.
This confusing language created two groups: those listening to the press interviews with Rep. Kansen Chu knew that the goal was for permanent DST (it was extremely clear in the news), but everyone else had to figure it out.

Given this confusing ballot, it’s remarkable that legislators speak as if this vote represents a clear mandate for permanent DST. Perhaps for voters who heard press coverage of Prop 7, this could be true, but I’ve talked to so many who didn’t know this, or even were confused about the “back/forward” question, and thought they’d be able to sleep more in the wintertime. For the record, we think it should be clear that nobody has asked the question about which schedule voters prefer.

In Germany, voters were asked to make a choice, with language written using words that I’m told translate to “permanent summer” and “permanent winter”. With language written like this, it should be clear that voters are not equipped to choose Standard Time. Who would vote for a German winter all year long?

As with many things, the role of government is to balance the needs of many parties, and here it can only be said that the early birds are being well represented by this rather opinionated language. And also, because younger people don’t turn out to vote, their “night owl” votes have not been counted. Let’s find the middle.

Legislators must balance needs of early birds and night owls

Even if permanent “daylight time” were the more popular vote (and it is favored by a lot of people), we think the public health evidence shows that higher obesity rates, higher cancer rates, higher accident rates, and more depression should sway the debate in the direction we have outlined here, to permanent standard time.

We do not think that government should find the best solution only for the early birds (even if they are the citizens who turn out to vote), and instead, they should find the best balance of timing for everyone. Epidemiological evidence from several different sources says that our schedules are already causing our sleep to be restricted, and it’s harming our health. Making us all wake up early in the winter will do more harm.
Setting our clocks to Standard Time, so that noon is when the sun is directly overhead, is the sensible and better choice.

**Speaking Up**

If you are in California and would like to voice your preference to your representative, you can find the right person to speak with at findyourrep.

In Florida, you can use this link to find your representative.

**Selected References**


http://diabetes.diabetesjournals.org/content/diabetes/65/6/1741.full.pdf
