OPINION + VOICES

Who wants to go to work in the dark? Californians need permanent standard time

UCLA Chancellor Gene Block says we must be mindful of the health consequences associated with insufficient morning light

Credit: Łukasz Hejnak/Flickr

While some people look forward to “falling back” one hour when daylight saving time ends, others feel their sleep routine is thrown off. A recent study says they may be right.

Gene Block and Johanna Meijer | February 28, 2019

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Gene Block

Gene Block is chancellor of UCLA and a distinguished professor of psychiatry and biobehavioral science. Johanna Meijer is a professor of neurophysiology at Leiden University Medical School in the Netherlands. This op-ed appeared in the Sacramento Bee.

When Californians voted in November to end the increasingly pointless process of resetting our clocks twice a year, it also was a step toward improving our health.

Mounting evidence suggests that disruptions to our body’s biological clock are harmful, and growing recognition of this fact by scientists has fueled efforts in other states and even the European Union to take action. But ceasing the biannual disruptions alone is not enough.

Here in California, where the sun rises over San Diego nearly an hour earlier than it does at the Oregon border, choosing permanent daylight saving time could create real health and safety issues for the northern part of the state.

In a state nearly 800 miles long, permanent daylight saving time would have the sun rising over San Diego in late December at 7:47 a.m. In San Francisco, sunrise would occur around 8:20 a.m. And in Crescent City, in the far north, it would rise at 8:42 a.m.

That means most children and many commuters across Southern California would pretty much always head out to school or work in daylight, while most everyone in communities from the Bay Area north would begin their work or school days during winter in darkness.

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Credit: UCLA

This lack of morning light can have serious impact on our biological clocks, which control the body's many daily rhythms including our sleep and wakefulness cycle. 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.

Shift workers, for example, who often start their days in darkness and go to sleep while the sun is still shining, are at increased risk for these health problems.

Many countries in the far north, such as Norway, have innovative artificial lighting strategies to deal with excessive winter darkness. We can certainly learn from their experience, but we also have choices that those in the far north do not.

The most important of those choices currently rests with California's legislature, which must be mindful of the health consequences associated with insufficient morning light.

On a national scale, federal officials should take notice of what happens in California. Even though Washington, D.C., has far bigger issues to sort through, U.S. Sen. Marco Rubio did introduce legislation calling for the U.S. to move to permanent daylight saving time last year. Yet imagine winter sunrise in Seattle, which would occur close to 9 a.m.

Permanent standard time is the only fair and viable option, not only for California, but the entire nation. California lawmakers, regardless of district, have a responsibility to residents in the northern part of the state. They also have an opportunity to make this important point to Congress, which might someday impose a permanent time change for the nation.

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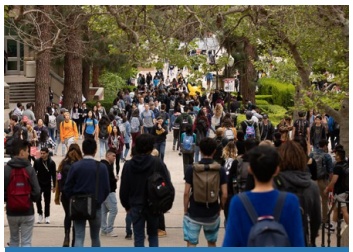

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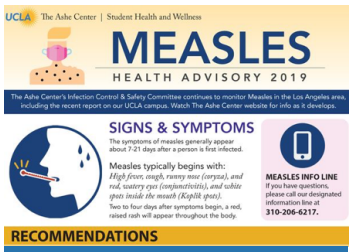

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Is year-round daylight saving time a good idea? Maybe not

USC experts confirm biological challenges of the time change; if anything, they say we should be on standard time all year.

BY **Joanna Clay** MARCH 19, 2019

California voters support keeping daylight saving time throughout the year, but USC researchers say that might not be a good idea. (Photo/iStock)

If you were yawning more than usual thanks to last week's switch to daylight saving time, you weren't alone.

It takes some people a full week to recover from feeling more sluggish than usual after rolling back the clock for daylight saving time. Experts call the phenomenon "social jet lag."

Much like the jet lag we experience after flying across time zones, losing an hour upsets our circadian rhythm. That not only throws off our sleep schedule but actually has impacts on the cellular level, since many biological functions are timed to that clock.

> It really messes people up.
>
> Steve Kay

"It really messes people up," said Steve Kay, the director of the USC Michelson Center for Convergent Bioscience who is considered one of the preeminent experts in circadian rhythm.

"It affects human performance. The data has been clear in terms of traffic accidents and there's also data that it's not great in terms of cardiovascular health: Heart attacks go up."

In California, daylight saving time could become year-round after voters in November approved Proposition 7. The ballot measure allows the state legislature to make daylight saving time permanent, provided federal law is changed to allow the move.

Research shows there are all kinds of health concerns when it comes to circadian disruption. When experienced long term, as is the case with night shift workers, an individual's likelihood to develop obesity, Type 2 diabetes or cancer increases, according to USC experts.

OSHA includes daylight saving time side effects in its trainings, since workplace accidents increase by about 6 percent.

Some proponents of the proposition brought up the health concerns, such as upticks in traffic accidents and heart attacks, but USC experts say they're missing the mark. Permanent daylight saving time wouldn't solve this issue; instead, it would prolong it — adding more days of social jet lag to the year.

Less light in the a.m. with year-round daylight saving time

There's a long-held understanding that experiencing light when you first get up is good for you, said USC Assistant Professor Travis Longcore, who researches night lighting. If we could shift our work and school schedules to accommodate the time change we would be fine, he said, but we don't. That "summer schedule," during which most of us wake up before the sun, could have real health implications if done long term.

A study on 150,000 nurses found that, over the course of five years, those who worked the night shift had a 30 percent higher chance of developing Type 2 diabetes. If they had other unhealthy habits on top of that, such as smoking, the diabetes risk increased threefold. There's also research that shows night shift workers are more likely to engage in unhealthy behavior, such as having a poor diet or exercise habits.

Longcore noted a study on four million Americans, comparing how far east they lived in their time zone with cancer rates. People who lived west within their time zones saw impacts: each 20 minutes of later sunrise increased certain cancers by 4 to 12 percent. In California, farther-west San Francisco would be hit harder than L.A., where the sun rises earlier, he said.

Year-round daylight saving time and cellular function

A recent study by Kay and his team showed that circadian disruption changed the way cells function to the point of increasing disease risk, including cancer.

It's also a change that could disportionately impact teenagers, whose clocks are biologically shifted to wake up later. When they sleep in late on the weekends, it's not just lethargy — it's biology, Kay said. That's the reason some schools are shifting their start times. A study showed students got 34 minutes more sleep, on average, when school started later.

"As we age, our biological clocks shift earlier," Kay said.

If anything, both Kay and Longcore agree, California should consider switching permanently to standard time, like Hawaii and Arizona. The Society for Research of Biological Rhythms penned a letter to the author of Proposition 7 in support of that. Although it would mean earlier nights, it would address the health implications associated by starting your day in darkness.

"Our highly evolved circadian lifestyle is making us ill," Kay wrote in a recent paper. "Humans are not evolved for night shifts, nighttime lights and intercontinental travel. Modern life challenges to our circadian system present a long-term threat to our health."

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Why Proposition 7 is bad for public health

USC
Nov 1, 2018 · 4 min read

Michael Herf, f.lux Software
Travis Longcore, USC Dornsife College of Letters, Arts and Sciences

Changing the clocks twice a year is indeed bad for our health. But a "yes" vote on Proposition 7, which encourages California's legislature to adopt permanent daylight saving time, is a cure that is worse than the disease. This plan would force us to wake up an hour earlier all winter long, and research tells us that waiting for a bus in the dark or driving to work before sunrise doesn't just feel bad, it is actually bad for our health.

Switching from standard time to daylight saving time each year increases accidents, heart attacks, and makes us sleep poorly for several weeks. But we also know from credible research that when we set our

clocks matters even more. Getting up too early in the wintertime increases depression, cancer, and obesity.

Year-round daylight saving time would make people wake up earlier than sunrise through the entire winter, with most people driving to work before sunrise. An inflexible daily work and school schedule forces people to get up before the sun, which disrupts the body's daily cycle, known as a circadian rhythm, creating what scientists call "social jet lag." Greater difference between solar time and social time results in greater circadian disruption. This is exactly what would happen during the winter months if permanent daylight saving time were adopted.

Research on human daily rhythms and sleep shows that we need light in the morning, and this perpetual "summer" schedule is harmful. Many people know someone who has depression in the winter, but increased rates of cancer are concerning as well. In a recent study of four million Americans living in more than 600 counties, researchers linked cancer rates to how far east people live in their time zone.

If you live on the eastern edge of a time zone, the sun rises almost an hour earlier for you relative to someone in the west. The results are stunning: for each 20 minutes of later sunrise, breast and prostate cancer increase by 4%, leukemia around 12%, and uterine cancer by 10%. A second study reviewing nearly 60,000 cases found a 7% increase in liver cancer for every 20 minutes later sunrise. For reference, the sun rises 23 minutes later in San Francisco than Los Angeles on election day.

The adverse impacts of permanent daylight saving time would be felt more in the western portion of the time zone. San Francisco and coastal northern California lie to the west of Los Angeles and would be subject to greater circadian impacts than Los Angeles. In addition, more northerly latitudes would experience greater impacts. It is odd that the authors of the ballot measure reside in areas where their constituents would be harmed more than others.

The experiment proposed by Prop. 7 has been tried elsewhere and failed. In 2011, Russia switched clocks to year-round "summer time." It was initially popular, but three years later only a third of Russians wanted to keep the system and it was abolished.

Despite the emotional appeal of a permanent summer, setting our alarm clocks one hour earlier in the winter does not bring us more light, it just makes us wake up to darkness, depriving people of sunlight critical to our physical and mental health.

Some may vote for this bill hoping for the possibility of permanent standard time, but a bill to do this has already failed in the state legislature. Instead, the sponsors of the proposition have stated in several media interviews and in the proposition itself that their intention is to use permanent daylight time, so this is why we think this proposition in flawed, and we do not think a Yes vote will lead to permanent standard time.

Chronobiologists, the scientists who study circadian rhythms, have issued a statement through their professional societies opposed to Proposition 7 and other similar measures elsewhere in the world. These societies, including the Society for Research on Biological Rhythms, identify that the right and healthy solution, which we also support enthusiastically, is to use standard time year-round. Evidence is strong that standard time year-round is better for sleep, heart health, and healthy weight. It would reduce cancer incidence and improve psychological well-being of the population as a whole.

Rather than chasing an illusion of permanent summer, voters should insist on a scientifically supported solution that benefits public health.

. . .

Michael Herf is president of f.lux Software, which develops software to help people control exposure to unhealthy light at night.

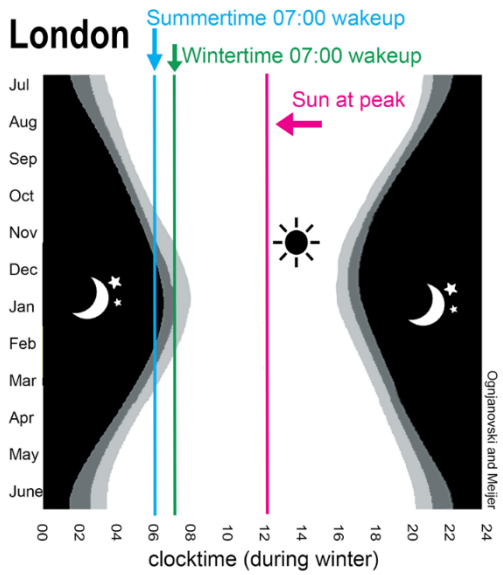
Professor Travis Longcore researches the effects of night lighting on the environment as a professor of architecture, spatial sciences, and biological sciences at the USC Dornsife College of Letters, Arts and Sciences.

Time to change – but only to ‘wintertime’

Johanna Meijer, Leiden University, the Netherlands, Oxford University, UK
Russell Foster, Oxford University, UK

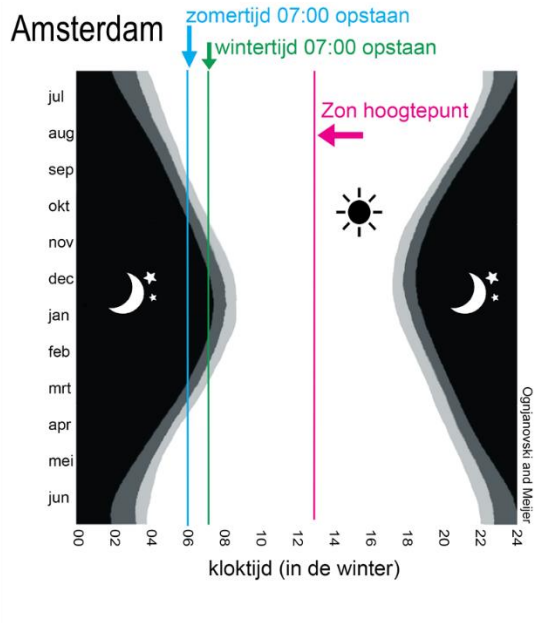
In August, the European Union voted to abolish the bi-annual change in clock time. `Whether the continent will be in constant wintertime or summertime remains to be decided. In a public international consultation that took place, a majority of the 4.6 million respondents voted for constant “summer time”. Whilst the abolition of the spring and autumn clock change will relief millions of people from a bi-annual burden, constant “summertime” is not the sensible option.

Wintertime is a confusing term. Wintertime or geographical time is based on the actual time of sunrise and sunset. When our alarm clocks are set to the geographical time, the sun is at its highest point at noon and lowest at 24h midnight. It is strange, therefore that we should denote geophysical time ‘wintertime’. By contrast, when we set our alarm clocks to “summertime” in the spring, the sun is highest at around 1PM, and lowest at 1AM. As a result, sunrise and sunset are one hour later than the real time of sunset/sunrise on that date. The apparently attractive up side of this shift is that the evenings are sunny and bright and we seem to experience “longer days”. But in fact, we fool ourselves: daylength remains unchanged. The earth follows its path around the sun, indifferent for how we turn the hands of our clock. While the length of the day seems longer, it is not.



A longer and brighter evening is inevitably at the expense of a later rise of the sun in the morning. What is the consequence? In summer, the later onset of sunrise, due to summertime, is hardly noticeable simply because we are still asleep during dawn. However, in winter, when days are short, the consequence of an imposed constant “summertime” would be that the sun rises noticeably later. In midwinter the sun arises around 8.00h with current wintertime. With constant summertime this will be at 9.00h. Thus, at the time when children travel to school and when the rush hour is at its height, we will be plunged into darkness or at best semi-darkness, more or less from the beginning of October to the beginning of March. Also, people working in outdoor settings, such as construction workers, will suffer from ongoing darkness.

Apart from this, we now appreciate that the lack of morning light has a major impact upon the adjustment of our internal biological clock. This clock is present in the entire plant and animal kingdom, to fine-tune physiology and behavior to the daily light/dark cycle. In humans, even before we wake, this internal clock acts to increase blood pressure, metabolism, apatite and our cognitive abilities in anticipation of increased levels of activity.



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.

Thus, introducing constant summertime is not as positive as one may think at a first sight. For at least 4 months in winter we will lack the correcting input of morning light resulting in a continuous jetlag; a classical miss match between our internal bodily system and the geographical day. The result will be that the alarm clock will force us out of bed and then we will commute to work or go to school in a poorly adjusted state, which promotes fatigue and lowers performance. No doubt, this will increase the incidence of traffic accidents in the morning. Teenagers are especially vulnerable to this disruption, as their clocks are slow. On non-school days teenagers tend to sleep-in and fail to experience morning light, so they miss the corrective influence of light. This will worsen with continuous summertime. Apart from these immediate consequences, scientific research has revealed that ongoing distortion of our biological clocks leads to a wide variety of diseases, including metabolic abnormalities, cardiovascular disease and, most of all, an increased vulnerability to depression.

With the introduction of artificial light about 100 years ago, we have gradually adopted a life style that is remote from natural rhythms in our environment. We humans feel that we can do what we like, when we like and can act independently of our biology or time of day. On the other hand, it has become clear from fairly recent research is that a properly timed biological clock is essential for good overall mental and physical health. Why would we act to risk sleep disorders, fatigue depression and good health, just to obtain a longer evening, by adopting "summertime" rather than "wintertime"? It is time we started to live in harmony with the natural world and not think that we can succeed by fighting against it.

Society for Research on Biological Rhythms

Dear Representative,

As experts in biological clocks and sleep, we have been following the initiatives of the European Commission and California Proposition 7 to abandon the annual clock-time changes in spring and autumn. Although we recognize that there are advantages/disadvantages associated with any choice, 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. The negative effects of maintaining Daylight Saving Time (DST) will be higher.

With ST there will be more morning light exposure in winter and less evening light exposure in summer. This will better synchronise the biological clock and people will sleep earlier relative to their work and school times. The feeling of chronic 'Social Jetlag' will be reduced compared to DST, the body will function better, psychological well-being and mental performance will improve. Throughout the year, ST will be healthier than DST in terms of sleep, cardiac function, weight, cancer risk, and alcohol- and tobacco consumption, to name a few examples.

We would gladly explain our advice in more detail as required.

Sincerely,

The Members of the Society for Research on Biological Rhythms

DST statement EBRS endorsed

To the EU Commission on DST

Chronobiology studies the influence of day-night rhythms and seasonal changes in living organisms (and received the Nobel Prize 2017 for these discoveries). As experts in biological clocks and sleep, we have been following the initiative of the European Commission to abandon the annual clock-time changes in spring and autumn in the EU. We would like to emphasize that the scientific evidence presently available indicates that installing permanent Standard Time (ST, or'wintertime') is the best option for public health.

With ST there will be more morning light exposure in winter and less evening light exposure in summer. This will better synchronise the biological clock and people will sleep earlier relative to their work and school times (1). The feeling of chronic jetlag (Social Jetlag) will be reduced compared to daylight savings time, the body will function better and mental performance will improve. Throughout the year, ST will be healthier than daylight savings time (DST).

ST improves our sleep (1) and will be healthier for our heart (2) and our weight (3). The incidence of cancer will decrease (4), in addition to reduced alcohol- and tobacco consumption (5). People will be psychologically healthier (6) and performance at school and work will improve (7). Abandoning clock changes will offer the unique nation-wide opportunity to improve general health by installing Standard Time.

We would gladly explain our advice in more detail as required. Sincerely,

European Biological Rhythms Society (EBRS) European Sleep Research Society (ESRS)
Society for Research on Biological Rhythms (SRBR)

1. **Kantermann et al. (2007) The human circadian clock's seasonal adjustment is disrupted by daylight saving time. Current Biology 17:1996-2000.**

2. **Merikanto et al. (2013) Associations of Chronotype and Sleep With Cardiovascular Diseases and Type 2 Diabetes. Chronobiol.Int. 30:470-477.**

3. **Roenneberg et al. (2012) Social Jetlag and Obesity. CURRENT BIOLOGY 22: 939-943.**

4. **Borisenkov (2011) Latitude of Residence and Position in Time Zone are Predictors of Cancer Incidence, Cancer Mortality, and Life Expectancy at Birth. Chronobiol.Int. 28: 155-162.**

5. **Wittmanm et al (2006) Social jetlag: Misalignment of biological and social time. Chronobiol.Int. 23:497-509.**

6. **Borisenkov et al. (2017) Seven-year survey of sleep timing in Russian children and adolescents: chronic 1-h forward transition of social clock is associated with increased social jetlag and winter pattern of mood seasonality. Biological Rhythm Research 48:3-12.**

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Why Standard Time is better

Michael Herf Mar 20

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 that 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.

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 what it feels 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

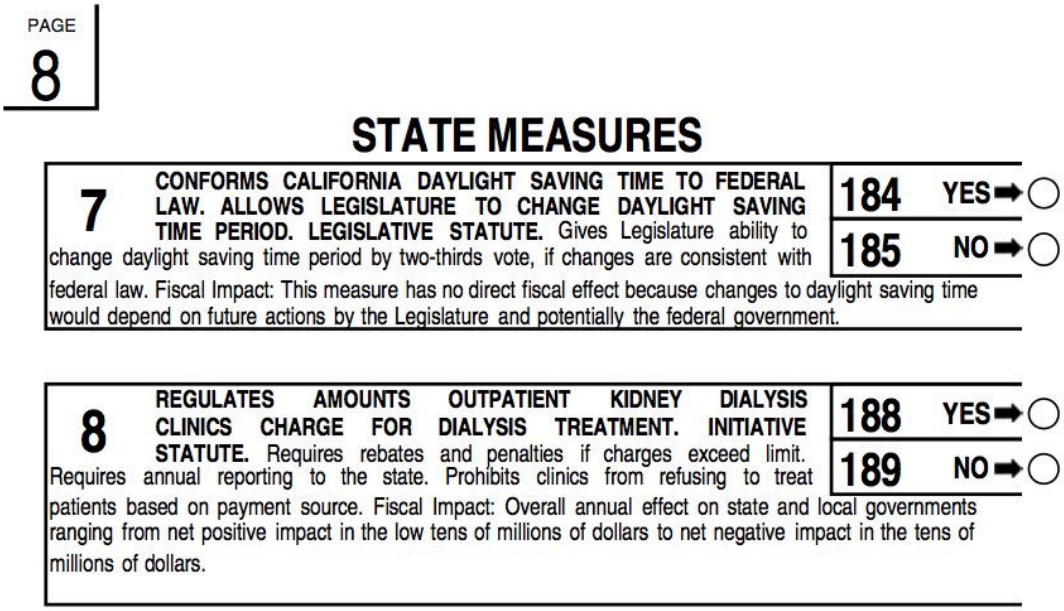
do less activity. Next, exercising right before bed can disrupt your sleep, so you should do it a little earlier in the day. And finally, sports injuries go up considerably when sleep is restricted.

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.



PAGE 8

STATE MEASURES

7 **CONFORMS CALIFORNIA DAYLIGHT SAVING TIME TO FEDERAL LAW. ALLOWS LEGISLATURE TO CHANGE DAYLIGHT SAVING TIME PERIOD. LEGISLATIVE STATUTE.** Gives Legislature ability to change daylight saving time period by two-thirds vote, if changes are consistent with federal law. Fiscal Impact: This measure has no direct fiscal effect because changes to daylight saving time would depend on future actions by the Legislature and potentially the federal government.

184 YES ➡ ○

185 NO ➡ ○

8 **REGULATES AMOUNTS OUTPATIENT KIDNEY DIALYSIS CLINICS CHARGE FOR DIALYSIS TREATMENT. INITIATIVE STATUTE.** Requires rebates and penalties if charges exceed limit. Requires annual reporting to the state. Prohibits clinics from refusing to treat patients based on payment source. Fiscal Impact: Overall annual effect on state and local governments ranging from net positive impact in the low tens of millions of dollars to net negative impact in the tens of millions of dollars.

188 YES ➡ ○

189 NO ➡ ○

California's Proposition 7

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.

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The Washington Post

Business

How living on the wrong side of a time zone can be hazardous to your health

By Christopher Ingraham
April 19

Sleep scientist Matthew Walker has observed that "human beings are the only species that deliberately deprive themselves of sleep for no apparent gain." We stay up late to watch our favorite TV shows. We wake up early to get to work or school on time. And twice a year we change our clocks, to the bewilderment of our circadian rhythms.

We also set up conflicts between our natural and social clocks in other, less obvious ways, a fact underscored in research published this month in the Journal of Health Economics. It turns out, the study found, that living on the wrong side of a time zone's boundary can have negative consequences on a person's health and wallet.

The culprit? More natural light in the evening hours.

To understand the study, co-authored by Osea Giuntella of the University of Pittsburgh and Fabrizio Mazzonna of the Universita della Svizzera Italiana, it is important to understand how time zones affect local sunset times. Traveling east to west, sunrise and sunset times get later, as the map above shows.

Panama City, Fla., for instance, is located on the far eastern end of

the Central time zone, while Pecos, Tex., sits on the far western side. This week, the sun set in Panama City about 7:12 p.m. Central time. In Pecos, it set more than an hour later, at 8:25 p.m.

Sunset is a powerful biological trigger: The fading of natural light causes the body to release melatonin, a hormone that induces drowsiness. As a result, people on the eastern side of a time zone, where the sun sets earlier, tend to go to bed earlier than those on the western side. The data below, derived from about 1 million users of the now-defunct sleep tracker Jawbone, illustrates this point, showing how bedtimes shift from east to west, with a sharp reset happening once you cross into a new time zone.

Giuntella and Mazzonna wanted to know how changes in bedtimes might affect a person's physical and economic well-being, so they conducted some tests.

Data from the American Time Use Survey by the Bureau of Labor Statistics, in which respondents keep detailed diaries of how they spend their days, confirms what the Jawbone data suggest: Those who live in the geographical area of a time zone with a later sunset went to bed, on average, 19 minutes later than people who live with earlier sunsets.

The problem for folks who go to bed later is that they generally cannot make up lost sleep on the back end: Work and school have set start times, whether you live in Pecos or Panama City.

"Individuals on the late sunset side of a time zone boundary are more likely to be sleep deprived, more likely to sleep less than 6 hours, and less likely to sleep at least 8 hours," the authors write. "The effects are larger among individuals with early working schedules and among individuals with children of school age."

Roughly speaking, 19 minutes of lost sleep a day translates to 115 hours of lost sleep per year. Given what's known about the importance of sleep for good physical and mental health, it's no surprise that Giuntella and Mazzonna found a greater incidence of health problems in areas where the sun sets later.

People on the late side of sunset across U.S. time zones were 11 percent more likely, on average, to be overweight and 21 percent more likely to be obese. Diabetes was more prevalent, and the risk of heart attack increased by 19 percent. Breast cancer rates were slightly elevated, too — about 5 percent higher than average.

The authors also found economic differences. Sleeping less is known to adversely affect productivity. As a result, the researchers found, "wages tend to be 3 percent lower on the late sunset side of the time zone border, suggesting negative effects on economic productivity."

Economic data suggests people don't put much of a price tag on living on one side of a time zone or the other. Housing prices and commuting times are comparable, for example.

But it's not all bad for the late folks. Giuntella and Mazzonna speculate later sunset times may pay for themselves in terms of the enjoyment people get out of them. "Individuals may derive more utility from enjoying leisure time with more natural light in the evening," they write. In other words, an extra hour of daylight for recreation may at least partially offset the loss of sleep.

"As long work hours, work schedules, school start times and the timing of TV shows can create conflicts between our biological rhythms and social timing, our findings suggest that reshaping social schedules in ways that promote sleeping may have non-

trivial effects on health and economic performance," the researchers wrote.

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Christopher Ingraham writes about all things data. He previously worked at the Brookings Institution and the Pew Research Center. Follow