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IF I COULD TURN BACK TIME: SHOULD WE LOCK THE CLOCK?

HEARING

BEFORE THE

COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION UNITED STATES SENATE

ONE HUNDRED NINETEENTH CONGRESS

FIRST SESSION

APRIL 10, 2025

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SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

ONE HUNDRED NINETEENTH CONGRESS

FIRST SESSION

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IF I COULD TURN BACK TIME: SHOULD WE LOCK THE CLOCK?

THURSDAY, APRIL 10, 2025

U.S. SENATE,
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION,
Washington, DC.

The Committee met, pursuant to notice, at 10:01 a.m., in room SR–253, Russell Senate Office Building, Hon. Ted Cruz, Chairman of the Committee, presiding.

Present: Senators Cruz [presiding], Scott, Young, Curtis, Blunt Rochester, Luján, and Markey.

OPENING STATEMENT OF HON. TED CRUZ, U.S. SENATOR FROM TEXAS

The CHAIRMAN. Good morning, everyone. Welcome back, Senator Scott, good to see you.

The Senate Committee on Commerce, Science, and Transportation will come to order.

Twice a year we find ourselves adjusting our clocks, shifting an hour of daylight forward in the spring, springing it forward, and falling back in the fall.

For many Americans this biannual ritual is a minor inconvenience, something we endure without giving it much thought, but when you take a closer look at the implications of changing the clocks, its impact on our economy, our health, and our everyday lives, we can see that this practice is more than an annoyance.

First, let us talk about energy savings, which has long been the most common justification for Daylight Saving Time. The original idea behind Daylight Saving Time was to reduce energy consumption, by making better use of daylight during the longer days of summer. The idea was simple, fewer hours of darkness meant less electricity consumption for lighting and heating.

This concept might have made sense in the early 20th century, when our economy and our homes relied much more heavily on energy consumption tied to daylight hours.

Today, the data show energy savings from Daylight Saving Time are de minimis if not entirely nonexistent, advances in technology, particularly in lighting and climate control, and increased domestic energy production, have drastically reduced the relative price of energy compared to the past, changing clocks biannually impacts our health.

Research has shown that the abrupt shift in time, especially the spring transition, when we lose an hour of sleep disrupts our internal circadian rhythms and cause us sleep deprivation. This leads

to increased risks of health problems, including higher rates of heart attacks, strokes, and even car accidents immediately following the time change.

In fact, studies have shown that there is a spike in workplace injuries and fatal car crashes during the days after we shift our clocks forward. The disruption to sleep patterns and the result in fatigue can have consequences on our productivity, mental health, and well-being.

The time change is also an inconvenience for families. For parents, especially those with young children, adjusting to the time change is no simple task, sleep disruptions can result in cranky children, restless nights, and a difficult adjustment period that can last for weeks.

We also need to consider the economic and social impact. There are arguments that longer daylight hours in the evening can boost economic activity in certain sectors, such as retail, tourism, and entertainment.

For instance, late afternoon golf leagues account for up to 40 percent of the annual revenue of some courses, while a majority of golf instructors reported that nearly 50 percent of their lessons are taught after 4 p.m. A golf course would lose an estimated $500,000 annually if it lost the extra hour of daylight in the summer. Of course, the early birds who like 7 a.m. tee times might be a bit annoyed with this shift.

Many states and countries, like Mexico, and Russia, and Turkey, have already taken steps to move away from changing clocks twice a year. Hawaii and Arizona have opted out of the practice, and other countries in the past 10 years have either abolished it or are in the process of doing so.

Congress has the authority to end this outdated and harmful practice. This hearing is an excellent opportunity to examine a thoughtful and rational approach to how we manage time. Whether we lock the clock on Standard Time year round or on Daylight Savings Time, let us think carefully about our health, our economy, and well-being, and embrace a sensible approach to time management. And I will now turn to Senator Blunt Rochester for her opening.

STATEMENT OF HON. LISA BLUNT ROCHESTER, U.S. SENATOR FROM DELAWARE

Senator BLUNT ROCHESTER. Thank you, Mr. Chairman, for holding this important hearing. In our increasingly connected world, it is more important than ever that we are thoughtful about what it would mean to pick a permanent time for our country. The Senate has tried this before, but the bill stalled as this body took a harder look at how time changes work state by state. What works in my home State of Delaware may not work in Washington State, But I know I speak for many Americans when I say it is time, it is time to figure this out.

People across our country are tired of the constant cycle of falling back and springing forward. I mean, who has not forgotten to change their clock on their microwave, I think mine is still on the wrong time, and felt the immediate panic of waking up late for

work? Or think about the parents of young children and pet owners who have to adjust sleep and feeding schedules twice a year.

Some would say that these are just inconveniences. But the back and forth between Daylight Savings Time and Standard Time needs to change and needs to stop. We need to stop the clock. We need to find a solution and stick with it.

Many states across our Nation have started to consider legislation to pick a permanent time. Some, like Delaware, have pushed for keeping Daylight Saving Time, the time we are in right now, permanently. Others have sought to keep the Standard Time, when we fall back, permanently.

But here is the thing: these twice-yearly time changes have real impacts on real people. We know that changing the clock disrupts sleep, which can lead to negative health outcomes. Several studies have noted issues with mood disturbances, increased hospital admissions, and even heart attacks and strokes. We also know that being able to see the sun improves mental and physical health as well. But more than that, time changes can impact the safety of our communities. Darker commuting times increase the risk of injuries and even death on our way to school or work.

My home state has one of the highest per capita rates of pedestrian fatalities, and dark roads with tired drivers make it more dangerous for pedestrians. The important thing is that we land on something consistent and make smart investments to keep people safe.

For example, there were programs that we authorized in the Bipartisan Infrastructure Law that focused on commonsense safety improvements, but they are set to expire this Congress. I hope the committee will keep this discussion in mind when it comes time to reauthorize these infrastructure investments, investments that could light, or that could light up dark streets, add rumble strips to medians, turn chaotic intersections into roundabouts, and more. These are the kinds of smart policy choices we can make to protect people year-round, regardless of whether it is Daylight Saving Time or Standard Time.

But the first step is getting us all on the same page. I am looking forward to today's conversation about the competing health, safety, and economic impacts of choosing a permanent time for our communities and moving the ball forward on this important issue.

Thank you, Mr. Chairman. And I turn it back to you.

The CHAIRMAN. Thank you, Senator Blunt Rochester. And I have to say, I think you have set a land-speed record for moving from the chair on the end all the way here. And I will just say Senator Cantwell probably needs to watch her back. And I am somewhat disappointed in your excellent remarks that we did not get you belting out the chorus of Cher's "If I Could Turn Back Time."

Senator BLUNT ROCHESTER. I told you it is something that peps us up. We need the energy.

The CHAIRMAN. Joining us today is our friend Senator Rick Scott from the Sunshine State to give remarks on his legislation, the Sunshine Protection Act.

Senator Scott, welcome back to the Commerce Committee.

STATEMENT OF HON. RICK SCOTT,
U.S. SENATOR FROM FLORIDA

Senator SCOTT. First off, Senator Cruz, thank you for the opportunity. And Senator Blunt Rochester, you have done a better job keeping your seat in this committee also than I was able to.

Thanks for the introduction and the invitation to introduce my bill, the Sunshine Protection Act, to finally lock the clock. Senator Cruz, I know your morning, it has been a tough week for you with the NCAA Championship. I do look forward to the one——

The CHAIRMAN. Your time has expired.

[Laughter.]

Senator SCOTT. All right. My bipartisan, Bicameral Sunshine Protection Act that will end the twice-yearly time change and make Daylight Savings Time the national year-round standard. I have the support of 17 of my colleagues here in the Senate and a House companion led by my friend Congressman Vern Buchanan from the Great State of Florida.

I am sure all of us have heard from our constituents on this. The American people are sick and tired of changing their clocks twice a year. It is confusing, unnecessary, and completely outdated. It is an understatement to say that our Nation has changed since the United States began changing the clock over a century ago. For example, American households have electricity now. We also have self-driving cars, computers, and cell phones.

Now, changing the clocks twice a year proves more of an annoyance to families than a benefit to them. In 2018, when I was Governor of Florida, I signed legislation that would allow the state to opt out of the practice of changing the time, and nearly two dozen other states have done the same, pending Federal approval that will come by passing the Sunshine Protection Act.

The American people love having an extra hour of sunlight, especially in my State of Florida, where that means more time you can enjoy outdoors and activities with families. Studies also show the potential for reduced cardiac issues, stroke, and seasonal depression, reduced robberies, and benefits to the agricultural and overall economy with an extra hour of sunlight. This is a common-sense change to simplify and benefit the lives of Americans, and we have a great opportunity to finally get this done with President Trump on board to lock the clock.

I want to thank the Committee for the consideration of the Sunshine Protection Act. I am optimistic we can get this passed, signed into law, and finally lock the clock.

Thank you.

The CHAIRMAN. Thank you, Senator Scott. You are welcome to stay if you like, but I know you have a busy schedule, so if you need to attend other responsibilities, you certainly can do so. And the game was great, except for the final minutes. I would have liked to lock the clock with 1 minute remaining.

[Laughter.]

The CHAIRMAN. That would have been an excellent idea.

Our first witness this morning is Scott Yates, the Founder of the Lock the Clock Movement. Mr. Yates started the movement to remove the biannual chore of changing the clock.

Our second witness is Jay Karen. He is the CEO of the National Golf Course Owners Association, where he represents thousands of golf course owners across the country.

Our third witness today is Dr. Karen Johnson, a practicing sleep medicine physician and professor of neurology at the University of Massachusetts, Chan School of Medicine, Baystate, she is here on behalf of the American Academy of Sleep Medicine.

Our final witness is Dr. David Harkey. Dr. Harkey is the President of the Insurance Institute for Highway Safety, which is an organization dedicated to reducing deaths, injuries, and property damage from motor vehicle crashes.

Mr. Yates, you may give your opening statement.

STATEMENT OF SCOTT YATES, FOUNDER, LOCK THE CLOCK MOVEMENT

Mr. YATES. Thank you so much, Chairman Cruz, Ranking Member Blunt Rochester, and members of the United States Commerce Committee. Thank you for inviting me—thank you for inviting me here today.

Allow me to start with a hypothetical. Imagine two people commit the exact same crime on the exact same day, and they are the same in every way. But today, one of them is out of prison, and one of them remains behind bars.

What is the difference? The second man was sentenced on the Monday after we spring forward into Daylight Saving Time. Researchers at the University of Washington reviewed every criminal sentence handed down in America over an 11-year period, and found the single harshest day of sentencing of the whole year was that Monday in March, when judges, like all of us, had been jolted awake an hour earlier than their bodies had been expecting.

That one seemingly harmless Government mandate, dialing our clocks back one hour means some people received harsher sentences than they otherwise would.

The harm does not stop there. Both of your opening statements alluded to all of the problems that we have, and peer-reviewed studies consistently show that heart attacks go up, strokes, car crashes, even miscarriages spike in those days following the spring switch.

A study from the University of Vienna found deaths, overall, just increase by 3 percent in those couple of days after the change. Medical errors go up, diabetics lose glucose control, crime goes up. Just yesterday, the *Journal of Neurology* published a report saying that more people get migraines in the days after the time change.

And why do we do this; for the farmers? No. The story about the farmers was always just a myth that was created as a PR stunt by a retailer in Boston who wanted more daylight for shoppers to have more time to shop. We thought it would sound better if we said it was for the farmers.

If changing the time twice a year is so deadly and such an outdated relic, why have not we fixed it yet? It is probably because of this issue we face about whether we should lock into permanent daylight or permanent Standard Time. I have seen countless polls, and I have talked to thousands of people about this. Most people do not actually prefer one or the other that much. They just want

to stop the switching. There are valid arguments for either permanent choice.

So what should Congress do? What should this committee do? My name is Scott Yates. I have been reading, writing, and testifying about this for nearly a decade, and I have this recommendation: Lock the clock, as this bill says, but after a 2-year implementation. If we wait until 2027, we will continue to allow states to opt out and opt into Standard Time, just as Hawaii and most of Arizona have done.

This is fundamentally a states-rights issue and a geography issue. Consider Indiana, Indiana, Indianapolis is roughly the same latitude as New York City, but about 700 miles west. For Congress to force Hoosiers to walk, to go to work and school in the dark only to accommodate barbecues in New York City seems rude. But as the Commerce Committee, you do have an interest in promoting a stable and predictable environment for commerce.

That is why I suggest, Congress establish a firm date, 2027, to permanently end the clock changing nationwide. States would then have ample time to decide if they want to remain in Daylight Saving Time or opt out and pick Standard Time. They would not have the option to continue the deadly twice-yearly switching.

With clear Federal guidance, schools can evaluate and pick their own bell times. Businesses can plan confidently, free from the confusion caused by time changes. And states would even have time to hold elections to let the people decide directly.

I started my remarks with that study about the judges, the reason researchers could that, and find so many other ways that the time change is harmful is DSC creates what scientists call a natural experiment. Scientists can compare real-world results about what happens when the time changes.

Interestingly, in traditional experiments with lab rats, scientists are careful not to change the clocks for Daylight Saving Time for the rats because it is too disruptive.

So my closing question for you today is this: At long last, can we treat our citizens with the decency that we treat our lab rats?

Thank you. And I am open to any questions.

[The prepared statement of Mr. Yates follows:]

PREPARED STATEMENT OF SCOTT YATES, FOUNDER, WWW.LOCKTHECLOCK.NET

Chairman Cruz, Ranking Member Cantwell, and members of the U.S. Senate Commerce Committee, Thank you for inviting me here today.

Allow me to start with a hypothetical. Imagine two identical people commit the exact same crime on the exact same day. They are the same in every way, but today one of them is out of prison rebuilding his life, while the other remains behind bars, draining state resources.

What is the difference?

The second man was sentenced the Monday after we "spring forward" into Daylight Saving Time. Researchers at the University of Washington reviewed every criminal sentence handed down in America over an 11-year period and found the single harshest day of sentencing was that Monday in March, when judges, like all of us, had been jolted awake an hour earlier than their bodies expected. That one seemingly harmless act—dialing back our clocks one hour—means some people receive harsher sentences than they otherwise would.

The harm doesn't stop there.

Peer-reviewed studies consistently show that heart attacks, strokes, car crashes, and even miscarriages spike in the days following the spring switch. One study from the University of Vienna found that overall deaths increased by 3 percent following

this annual clock change. Studies show other problems: Medical errors spike. Diabetics lose glucose control. Crime goes up. People are less empathetic and helpful.

And why do we do this? For farmers?

No. The story about farmers was always just a myth, created as a PR stunt by a retailer in Boston who wanted shoppers to have more daylight after work. He thought it would sound better to say it was for farmers.

If changing the time twice a year is a deadly, outdated relic, why haven't we ﬁxed it yet? I suspect it's because we're all too groggy after the time change to decide. But the real issue is simpler: we can't agree whether to adopt permanent Standard Time or permanent Daylight Time.

I've seen countless polls and talked with thousands of people—most don't strongly prefer one time over the other; they just hate the switching. There are valid arguments for either permanent choice.

So, what should Congress do?

My name is Scott Yates and I've been reading and writing about this as a hobby for nearly a decade, and I have this recommendation: Lock the clock into permanent DST in *two years,* in 2027, while continuing to allow each state to opt out and remain in Standard Time if it decides to do so, as Hawaii and Arizona have already decided.

This is fundamentally a states' rights issue.

Consider Indiana. Indianapolis is roughly the same latitude as New York City but about 700 miles west. For Congress to force Hoosiers to commute and send children to school in winter darkness, only to accommodate barbecues in New York, feels . . . rude.

But as the Commerce Committee, you do have an interest in promoting a stable and predictable environment for commerce.

That's why I suggest Congress establish a ﬁrm date—2027—to permanently end clock-changing nationwide. States would then have ample time to decide if they want to do nothing and remain in Daylight Time or opt out and pick Standard Time. They wouldn't have the option to continue the deadly twice-yearly switching.

With clear Federal guidance, schools can evaluate optimal start times and businesses can plan conﬁdently, free from the confusion caused by time changes. States would even have time to hold elections to let the people decide directly.

I started my remarks with that study about judges. The reason researchers could do that—and ﬁnd in so many other ways that the time change is harmful—is that DST creates what scientists call a "natural experiment." Scientists can compare real world results about what happens with the time changes.

Interestingly, in traditional experiments with lab rats, scientists are careful not to change the clocks for DST. It's too disruptive.

So my closing question for you today is this: At long last, can we put aside partisanship and take action to treat our citizens at least as well as we treat our lab rats?

Thank you, and I look forward to any and all questions.

For a full briefing book, a state-by-state analysis, and a summary of the voluminous research into this topic, please see *www.LockTheClock.net.*

The CHAIRMAN. Thank you, Mr. Yates, for a very interesting testimony.

Mr. Karen.

STATEMENT OF JAY KAREN, CHIEF EXECUTIVE OFFICER, NATIONAL GOLF COURSE OWNERS ASSOCIATION

Mr. KAREN. Good morning, everyone. Thank you, Chairman Cruz, Senator Blunt Rochester, and members of the Committee, for asking me to enter testimony on behalf of the members of the National Golf Course Owners Association on a pretty complex issue.

We are headquartered in Charleston, South Carolina, and represent approximately 4,000 public courses, private clubs, municipal courses, and resorts throughout the United States. A little bit about the golf economy, many elected friends see golf simply as a game until it is time to talk about taxes, land use, water, employment matters, tourism, zoning, et cetera.

What comes into view is a $102 billion industry employing nearly two million people across 15,000 properties and two million acres of land so that nearly 30 million Americans can enjoy a great walk outdoors with strangers, friends, and family while hitting a little white ball.

Little known fact: 75 percent of golf courses in America are open to the public, and nearly $5 billion each year is raised for charitable causes through golf. I also understand golf outings can be an effective fundraiser for political campaigns. The health benefits of golf are well documented, so we tend to vehemently disagree with Mark Twain's assessment of golf as "a good walk spoiled".

Now, about the clock, locking the clock does not change how much daylight we have, just where it shows up on the clock. For golf and many outdoor activities, a shift can have significant economic and wellness implications. Golf thrives on what we call recreational daylight, the overlap of sunlight and people's availability to be outdoors.

Americans overwhelmingly prefer evening recreation over early morning. This is not just about golf, it is about soccer, jogging, walking, biking, tennis, and so much more. Making Standard Time permanent would shift 1 hour per day from recreational to non-recreational daylight. Simplistically, it trades 8 p.m. for 8 a.m. At golf courses, later hours generate about 40 percent more revenue per hour than early mornings.

Trading backward would cost the average public golf course at least 7 to 8 percent of their annual revenue by removing the best inventory we have on our shelves, which is approximately 37 million rounds of golf, and would cost the industry at least $1.6 billion or nearly $200,000 per course. This analysis only includes green fee revenue, and does not include spending on golf car rentals, merchandise, food and beverage, golf lessons, and other areas of the business.

Thus, only 7 percent of our members support making Standard Time permanent. Those who favor Standard Time year-round say their morning play is more valuable to them than their afternoon play. These may be resorts that want players off the course and in the restaurants at a reasonable hour.

Now, making Daylight Saving Time permanent would provide additional recreational daylight from November to March and would add an estimated 23 million rounds to the current golf inventory. This would give the industry a tailwind of about $1 billion, or roughly $250,000 per affected facility. Sixty-four percent of our members support making Daylight Saving Time permanent. The status quo, changing of our clocks twice per year, avoids both the significant downside while forfeiting the moderate upside.

Twenty-seven percent of golf course owners and operators support keeping the status quo of changing the clocks. Many golf courses slow down in the winter and enjoy having some relief later in the day for their employees with the sun setting earlier. Or they may have a healthy clientele of older players who would prefer no disruption to their 7 a.m. tee time or their eleven o'clock bridge game. Keep in mind all these figures do not include thousands of private clubs, which would augment the impacts in both directions by an enormous sum.

In conclusion, the Senate is facing a classic Gordian knot. There will be winners and losers no matter which way the knot is cut. But our members clearly prefer Daylight Saving Time and strongly oppose permanent Standard Time.

We recognize the sleep-related arguments for Standard Time, but the benefits of extended daylight for physical and mental health, outdoor recreation, and public safety are significant. Obesity, depression, and crime all have ties to reduced daylight and sedentary lifestyles.

So in short, we urge the Senate to avoid the consequences of permanent Standard Time. We encourage solutions that preserve evening daylight for golf, for health, for recreation, and local economies.

Thank you.

[The prepared statement of Mr. Karen follows:]

PREPARED STATEMENT OF JAY KAREN, CHIEF EXECUTIVE OFFICER, NATIONAL GOLF COURSE OWNERS ASSOCIATION

Thank you, Chairman Cruz, Ranking Member Cantwell and members of the Committee for allowing me to enter testimony on behalf of the members of the National Golf Course Owners Association. I sincerely appreciate the time you are setting aside for a discussion about a complex and consequential matter.

My name is Jay Karen, Chief Executive Officer of the National Golf Course Owners Association. NGCOA, headquartered in Charleston, South Carolina, represents over 4,000 small businesses throughout America and serves as a vital resource for owners, operators, and general managers of various types of golf facilities, including privately-owned public courses, private clubs, municipal courses and resorts. The NGCOA provides business-critical information, education, networking opportunities, and advocacy to help our members and the greater industry operate their golf facilities efficiently and sustainably.

Golf as Part of the U.S. Culture, Land and Economy

While golf is often seen as a game enjoyed by a small, yet passionate group of people, golf has long been entrenched in the fabric of American society as one of the Nation's leading participation sports. In addition to our rich history, both at the professional and recreational levels, golf is a dynamic, growing and evolving industry that's impacting the broader United States economy in a wide variety of ways.

A few tidbits about the golf industry:

- 28.1 million Americans played golf in 2024 on over 15,000 golf courses in the United States, laid out across 2 million acres of cared-for land (about the size of Delaware and Rhode Island combined), of which nearly 80 percent of golf courses are public access. Golf's goodness was showcased during the most difficult COVID years, as millions of people flocked to the Nation's courses for the very first time for much-needed outdoor recreation.
- Golf is an activity and business with a large economic footprint that spurs millions to travel, make purchases, and build and buy houses connected to golf. The business of golf drove $101.7 billion in economic activity throughout the U.S. in 2022, an increase of 20 percent over 2016. Golf tourism overall is the second-biggest economic driver in the industry, with golfers generating over $31 billion in travel-related golf expenditures within the U.S. Today, golf has an extended economic impact of over $226 billion, providing 1.65 million Americans with quality employment opportunities.
- Golf leads all other sporting industries in charitable giving, raising close to $5 billion through nearly 150,000 charitable golf events at more than 80 percent of all golf courses. Golf also tends to be an effective fundraiser for political campaigns!
- Golf provides valuable green space, as trees and turfgrass at courses improve air quality by producing oxygen and trapping pollutants, thus preventing them from reaching groundwater supplies. U.S. golf courses, which also serve as sanctuaries for a wide variety of plants and animals, continue to exhibit dramatic input reductions, savings, and technological advancements when it comes to environmental sustainability. Perhaps most notable is the industry's management

of its most precious resource—water—with usage at golf courses dropping 29 percent since 2005.

- Golf delivers value in ways beyond jobs, revenue, taxes, and multiplier effects. Golf is a lifestyle, a community asset, and a positive contributor to physical, mental and social wellness. Playing golf offers significant health benefits by promoting physical activity, mental wellness, and social connection. A typical 18-hole round involves walking 4–6 miles and burning up to 2,000 calories. Studies show golfers have a 40 percent lower mortality rate than non-golfers of the same age. The sport also supports mental health, particularly for adults aged 35–49, who report using golf as a way to reduce stress and recharge. In 2022, 97 percent of U.S. golf facilities hosted programs to expand recreational access, underscoring golf's role as a community wellness asset. Golf combines exercise, nature, and friendship into a sustainable lifelong activity.

Day in the Life of a Golf Course Operator—Sun-Up to Sun-Down

A golf course operator's day starts before dawn, coordinating with maintenance crews and reviewing the tee sheet and weather. As players arrive, they oversee operations, monitor pace of play, and handle early food and beverage service. Midday brings office tasks, course checks, and managing staff or guests. Afternoons shift toward twilight play, lunch traffic, and planning upcoming events or communications. Evenings focus on closing duties, cart returns, and prepping for the next day. It's a fast-paced blend of hospitality, logistics, and fieldwork, balancing customer experience, team management, and revenue across changing daylight, weather, and play patterns. No two days are ever the same.

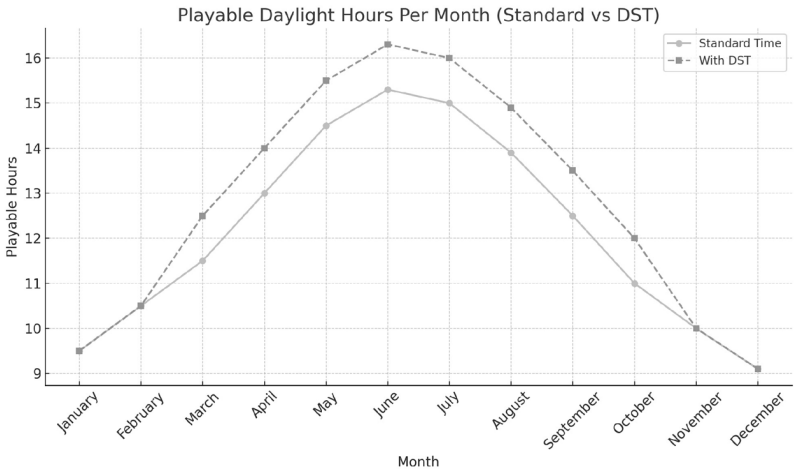
Sunrise and sunset directly shape a golf course operator's daily play window, staffing needs, and revenue potential. Tee times are scheduled based on available daylight, with early starts shortly after sunrise and final rounds finishing at sunset. Some courses, like Pebble Beach Golf Links, even have lights in the trees on the finishing green to accommodate golfers trying to squeeze in every last bit of play. Seasonal shifts in daylight affect how many rounds can be played, staffing schedules, and the timing of events or maintenance. Operators use this information to plan twilight pricing, ensure safety, and optimize food, beverage, and cart operations. In short, daylight hours are the framework for nearly every operational and financial decision on the course, impacting both the guest experience and the bottom line.

Seasonal changes in sunrise, sunset, and weather, especially frost, significantly impact how golf operators plan each day. In winter, even if sunrise is technically around 7:30 AM, play may be delayed until 9:00 or later due to frost, which can damage turf if disturbed. This reduces the number of playable hours and limits tee time availability. As a result, operators often start later, compress the tee sheet, and reduce staffing. In contrast, summer offers long days with early sunrises and late sunsets, allowing more tee times, twilight play, and higher revenue potential. Maintenance also adjusts seasonally—crews may need to shift schedules to prepare the course before first light in summer, while winter prep happens in a tighter window. Event planning, F&B hours, and dynamic pricing models must all be adapted to the season's light and weather. In short, seasonal daylight and frost risk are critical variables in maximizing playability, revenue, and turf health.

Recreational Daylight—The Industry's Lifeblood

We know that "locking the clock" doesn't increase or decrease the number of daylight hours for any service provider in any geographies around the US; it simply changes where that daylight occurs on our clocks. Why does this matter to golf? Golf relies on what we call "Recreational Daylight," which are the hours of the day that line up with the sun's light and people's general availability to be outside to enjoy recreational activity. Historically people are inclined to pursue recreation and outdoor activities at a higher rate for "after-dinner" than "before-breakfast" daylight. Proposed changes to "locking the clock" would have the following effect for golf:

- Making Standard Time permanent would shift one hour per day for every course in the country (in their respective season lengths) from recreational to non-recreational daylight (*i.e.,* trades 8PM for 8AM).
- Making Daylight Saving Time permanent would provide additional recreational daylight hours for dates in November to March. Two distinctions: Northern facilities wouldn't benefit as much, because these are non-season months due to temps/snow, etc, and these months are also peak season for the snowbird locations such as FL and AZ



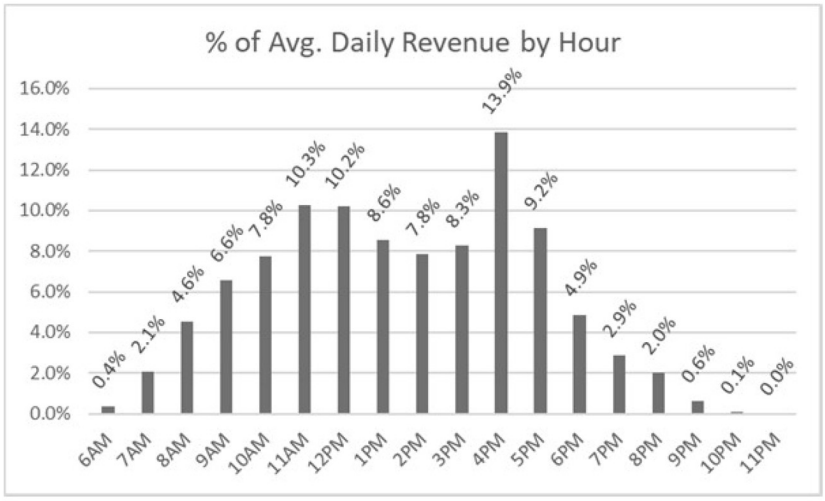
Latitude matters in golf relative to how daylight length varies during the year. Perhaps the best way to explain this is to look at the daylight length at June summer solstice in northern latitudes vs. a south U.S. benchmark:

- Miami, FL (benchmark)—13 hrs 45 mins of daylight
- Minneapolis, MN—15 hrs 37 mins of daylight (almost 2 hours more!)
- Seattle, WA—15 hrs 59 mins (+ 2 hrs)
- Sioux Falls, SD—15 hrs 36 mins (+ 2 hrs)
- East Lansing, MI—15 hrs 21 mins (+1.5 hrs)
- Buffalo, NY—15 hrs 21 mins (+1.5 hrs)
- Boston, MA—15 hrs 17 mins (+1.5 hrs)

In a formula that adjusts for weather, this means that a course in Minneapolis has room for 50+ more golfers per day than Miami on the same date. The Minneapolis course will continue to have more daily capacity than a course in Miami through the autumnal equinox in September. This relationship plays out across the northern U.S.

- Northern courses benefit from the annual daylight distribution naturally.
- This is also a factor fueling why golf participation is significantly higher in northern vs. southern states.

Golf courses in general generate higher revenue in later-day vs. early-morning hours. Based on analyzing a range of courses and their Point of Sale (PoS) data for revenue by hour, the distribution below illustrates revenue as an average representation:



Afternoon and evening daylight revenue is approximately 40 percent higher than before-lunch hours for the average golf facility. Hence, trading-backwards (eliminating DST) is going to cost the average operator about 7–8 percent of their annual revenue.

Here is a look at the impact—either direction—on approximately 8,000 public, regulation-length golf courses in the United States. This economic picture only includes the gain or loss in green fee revenue, and does not include the impact on spending on golf cart rental, merchandise, food and beverage, golf lessons and other areas of the business. Keep in mind this does not include thousands of private clubs, which would augment the impacts in both directions.

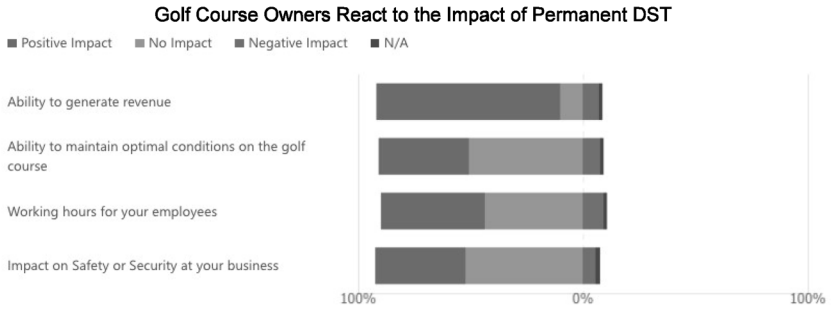
	Permanent Standard Time	Permanent Daylight Saving Time
Public Regulation Courses	8,000	
Hours per week lost	7	
Weeks impacted	34	
Capacity Rounds per Hour	28	
Total Lost Rounds	-53,000,000	
Likely Utilization Factor	70%	
Rounds Played Lost or Gained	-37,000,000	+23,000,000
% of Annual US Total	7.0%	+4.3%
Green Fee (only) Translation	-$1.665B	+$1.035B

- Making Standard Time Permanent would cost all states golf revenue to the tune of $1.6B or 7.5 percent of their total annual green fee income, or approximately $162,000 per course.
- Making Daylight Saving Time permanent gives the industry about half that increment of a tailwind of $1B or 4.6 percent of green fee income, or approximately $250,000 per facility.
- Leaving the clock changing as-is obviously avoids both the significant downside while forfeiting the moderate upside.

Daylight Saving Time—Industry Sentiment

83 percent of NGCOA course owners and operators surveyed feel a permanent change to Daylight Saving Time would benefit the overall success and viability of

their businesses, though a lesser 64 percent support making Daylight Saving Time permanent. Our assumption is that the gap represents those who don't believe the change and related disruptions to business and lives are worth it.



To illustrate additional complexities of this, golf course superintendents employed at golf courses report only 40 percent of their surveyed members feel a move to permanent DST would benefit the success and viability of their work, with 33 percent being unsure and 27 percent saying it would not be helpful.

Below are direct comments on Daylight Saving Time from industry practitioners:

As an owner-operator of the largest private country club in Indiana, staying on Daylight Saving Time is the best for all outdoor activities. Whether it's pickleball, golf, outdoor dining, boating, walking, etc., people use more time in the evening than in the morning. When I moved to Indiana 12 years ago, one of my favorite intangibles was the amount of daylight in the evenings. You can play golf in Indiana until 9:30. That's amazing and it means that members are playing 18 holes well past the traditional end of the workday.

Even though we are in the far western portion of the Eastern time zone, I still wish I had even more daylight in the evenings and I dread when we go back to Standard Time in November. It's the end of February, and we can be outside until 6:30. I wish we were on Daylight Savings time today and I could be outside until 7:30 on this 60-degree, February day.

As a golf teacher, I am able to teach the public after they are done with their workday, therefore extending my ability to generate revenue. However, due to maintenance, I am unable to teach in the mornings.

We are in the Central Time Zone but within 10 miles of Eastern Time. In the winters, it gets dark here at 4:00 pm. If you have a long frost delay, it can really limit the number of tee times that could finish 18 holes before dark.

At our daily fee municipal golf course, we feel as if going to permanent Daylight Saving would be more beneficial in the long run to our revenue stream based on the amount of play after people get off of work. The maintenance crew's working time would be the same (they start working 1 hour before sunrise). Standard time would take golfers away after work and we do not see many people showing up way early to get their round in.

Permanent Daylight Saving Time is a big positive for golf and other recreation activities including youth and adult baseball, soccer, football, tennis, pickleball, etc. More outdoor recreation activities occur in the evening. More evening light increases participation and revenue while also decreasing lighting expenses at outdoor fields.

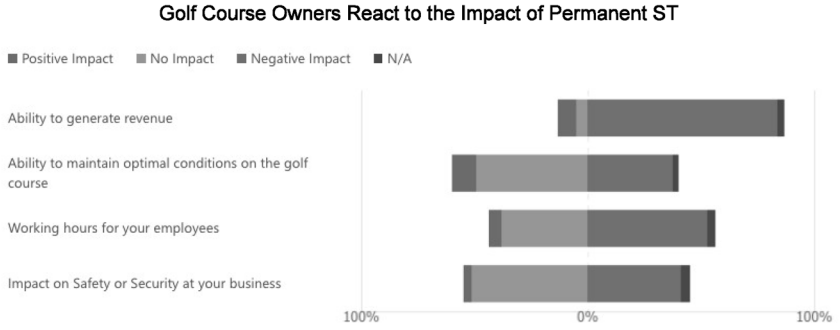
Evening golf generates more after work activity including serving dinner. We would align our morning shifts with new sunrise times. Early morning players might be put off by starting later, but they will adjust. These are generally the lowest revenue players. I am all in on Permanent Daylight Saving Time.

Having an extra hour of daylight for the evening hours provides us with more revenue opportunities than opening the tee sheet earlier. We have many more golfers who prefer to play 9-holes after work than those who would come at say 5:00–5:30 am.

Standard Time—Industry Sentiment

9 percent of NGCOA members feel a permanent change to Standard Time would benefit the overall success and viability of their businesses, and 7 percent support

making Standard Time permanent. While some course owners feel Standard Time would support the morning-heavy businesses they run, most respondents feel a move to permanent Standard Time would negatively impact their ability to generate revenue, to maintain optimal conditions on the course, to have reasonable working hours for their employees and their ability to provide safety and security at their businesses.



To illustrate additional complexities of this, golf course superintendents report only 19 percent of their surveyed members feel a move to permanent Standard Time would benefit the success and viability of their businesses, with 35 percent being unsure and 46 percent saying it would not be helpful.

Comments on Standard Time from industry practitioners:

We are in a resort vacation area and our busiest times are mornings. Most visitors have evening dinner or other plans. Morning help is also easier to find than evening help.

I am unsure how changing to DST would affect our business, as we don't play golf in the winter. However, moving to ST would significantly negatively impact our business. We have a significant amount of late afternoon play. No-one will want to play at 4 am, but a number of people play at 6 pm and wouldn't finish before dark if ST was implemented.

We are providing golf during DST under the current system. So in MN it would offer no change to the golf season. However, Standard Time would be terrible for MN golfers. It already is light so early in the summer here (with DST) that taking away that extra hour of evening golf would be no good. We don't need it to be light at 4 AM under the Standard time system.

Although ST would allow some courses to have grounds maintenance start earlier, many courses may not be able to take advantage of the earlier start due to local noise ordinances.

When working a 12-month calendar, having earlier leave times at the end of the day is needed. Going home later will make hiring more difficult if it is for extended time. The winter months are a needed break and allow employees to spend more time with their families.

Permanent Standard time would cause income loss that would be devastating to our public course!

A change to Permanent Standard Time would devastate the revenue we are able to generate. I am currently able to sell early morning tee times, then host a late-morning golf outing and an evening after-work golf league. Losing an hour of evening light would only be able to sell it twice.

Standard Time would be a disaster for golf & outdoor recreation. If we lock into Standard Time year-round, here's what we're facing:

- *4:30 AM sunrises that no one benefits from.*
- *An impossible hiring situation for maintenance crews starting at 3:30 AM.*
- *Tee sheets with massive gaps in the morning and no twilight rounds to make up for it.*
- *Leagues, tournaments, and evening events canceled or severely limited.*
- *A massive economic hit—not just to golf, but to all outdoor recreation and tourism.*

If we had permanent Standard time it would affect our ability to get the maintenance out early in the morning due to the timing of the local noise ordinances. We may actually lose some of those morning times because we would have to start later in the day. The one positive I would see in permanent Standard time is being able to get golf shop and cart staff home a little earlier. Here in Idaho it is light until almost 10 pm in June/July and cart staff especially can be here until 11 pm.

Going to a permanent DST would reduce my facility's revenue by over $144,000 by eliminating my first hour of tee times, 7am to 8 am. Additionally, adjusting maintenance schedules to avoid working in the dark is not desirable.

The high fixed costs of maintaining a golf course (or any business) would remain the same whether or not we are on standard time or daylight savings time. A typical 18 hole golf course in Michigan budgets approximate 50 percent of their overall expenses to go to course maintenance. So with that lost revenue, and the same fixed costs for a business where does that leave a business to cut? The job impact in Michigan from the golf industry is 60,000! How will that affect the economic health of Michigan?

Status Quo—Industry Sentiment

27 percent of NGCOA members support keeping the current status of changing the clocks twice per year. And as we identified previously, there is a 19 percent gap between those who say Daylight Saving will benefit their business and a desire to actually lock the clock on DST. It can be interpreted that between a quarter and one-third of our members would prefer that we keep changing the clocks twice per year. Many golf courses in areas that slow down in the winter and receive modest play enjoy having some relief later in the day for their employees with the sun setting earlier. Thus, many enjoy the changing of the clocks with the changing of the seasons for workplace culture benefits.

Comments on Status Quo from industry practitioners:

Since we are not open for golf in the winter months, switching to DST permanently would not have much effect on our operation. Switching to ST would not benefit us as we would not start earlier in the morning, and would lose time in the evening for golf revenue.

DST in the winter would result in not opening until well after 10:00 on certain days due to frost. Thus likely causing a significant loss of morning rounds (seniors) in the winter without any gain in the evening due to sunset at 6:00 (not enough time for golf after work). ST in the summer would obviously significantly impact league and evening play without an offsetting gain in the morning with sunrise being before 5:00 a.m. for much of the summer. Our best scenario is the current system of switching between DST & ST.

For the Florida golf industry, a change to permanent Daylight Saving time would cost us lots of revenue as it would be darker and longer in the winter mornings. This is the time of year that Florida clubs make all or most of their money. Golfers do not play in the evening in the winter, so we would see no additional revenue during the winter months. The status quo makes the best sense for the Florida golf industry.

This issue is far bigger than golf. It's also for the safety of children so they don't have to go to school in the dark in winter. Anyone who puts business profitability over the safety of American children is, in my opinion, on the wrong side of history. Also, to all of the people who want to eliminate the practice of changing clocks twice a year. . . . . why? What legitimate reason do they have other than they don't like it?

Making DST permanent would bring in more revenue in the short term. However, costs would also increase, and employees' work/life balance would also be affected. Evening times are great for those with families and family commitments. Adding more sunlight hours during this time would affect that. I don't see many clubs adding additional staff, even if their revenue streams increase.

Conclusion

The golf industry is acutely aware of how making potential changes to the clock by eliminating either Daylight Saving Time or Standard Time is a modern-day Gordian Knot for lawmakers. There will be winners and losers no matter which way the knot is cut. Data and sentiment from the golf industry, though, reveal a clear favorability toward permanent Daylight Saving Time. Overall, permanent DST is viewed as more beneficial to the golf industry particularly for small business revenue, accessibility to the game, and general recreational enjoyment and benefits. Our industry is uniquely tied to daylight, and the number of playable hours directly

affects the number of rounds we can offer, the staff we employ, and the revenue we generate, especially in the late afternoon and early evening.

The National Golf Course Owners Association does not take a formal position on whether Congress should make Daylight Saving Time permanent, because a healthy portion of our members prefer the status quo. However, while a very small percentage of our members favor Standard Time, we want to make it clear that we oppose any proposal to make Standard Time permanent and year-round for the entire nation. Permanent Standard Time would result in earlier sunsets for most of the year, particularly in spring, summer, and early fall, the peak seasons for most of our industry. This shift would eliminate critical late-day tee times and reduce twilight leagues, after-work play, food-and-beverage revenue, cart fees and more. In some regions, 25–40 percent of daily rounds begin after 3:00 p.m. Permanent Standard Time would put much of that business at risk. Beyond revenue, this would hurt seasonal employment, fundraising events for charities, and accessibility for working golfers who rely on evening hours. These economic impacts would be most severe in states with long seasons and large golf economies, such as Florida, California, Arizona, and the Carolinas, as well as the Northern tier, seasonal and golf-dense places like Michigan, Pennsylvania, New York, New England and the Pacific Northwest.

While we sympathize with some of the sleep-related arguments for permanent Standard Time, we believe the counterweight of outside activity in the latter parts of the day provides significant health benefits that cannot be ignored. Child and adult obesity can be stemmed through sun-lit play and exercise outdoors. Hikers, joggers and bikers are at greater safety risk—or may choose not to participate—with earlier sunsets. The biological benefits of sunlight and related Vitamin D are well documented, including improved immune functions, bone health and positive mental health. In short, a reduction in active hours would likely lead to further health issues caused by a more sedentary lifestyle. Ample research supports serious crime reduction being correlated with increased daylight. We would rather see the Senate favor the status quo over permanent Standard Time.

We ask the Senate to consider the practical and economic consequences of losing evening daylight. We encourage policymakers to explore solutions that preserve extended daylight, which supports not only golf but also greater outdoor recreation, tourism, hospitality, good health and local economies.

We extend our gratitude to the following people and organizations for contributing information and insight to our written testimony:

- Ronnie Miles, Senior Director of Advocacy, National Golf Course Owners Association
- Thomas Smith, Chief Operating Officer, National Golf Course Owners Association
- Jim Koppenhaver, Principal, Pellucid Corporation
- Stuart Lindsay, President, Edgehill Golf Advisors
- Greg Nathan, President and CEO, National Golf Foundation
- David Lorentz, Chief Research Officer, National Golf Foundation
- Greg McLaughlin, CEO, World Golf Foundation
- Chava McKeel, Director of Government Affairs, Golf Course Superintendents Association of America

The CHAIRMAN. Thank you. Dr. Johnson.

STATEMENT OF DR. KARIN JOHNSON, PRACTICING PHYSICIAN AND PROFESSOR OF NEUROLOGY, UMASS CHAN SCHOOL OF MEDICINE BAYSTATE—ON BEHALF OF THE AMERICAN ACADEMY OF SLEEP MEDICINE

Dr. JOHNSON. Thank you, Chairman Cruz, Senator Blunt Rochester, distinguished Members of the Senate. Thank you for having me.

My name is Dr. Karin Johnson. As stated, I am a neurologist and practicing sleep medicine specialist in Massachusetts, and I am here representing the American Academy of Sleep Medicine.

I want to extend my gratitude to Chairman Cruz for having this timely committee hearing. In December, President Trump called to

end Daylight Saving Time, and his Make America Healthy Commission's mandate to reduce chronic diseases, especially in children, aligns with permanent Standard Time. Unfortunately, permanent Daylight Saving Time and the Sunshine Protection Act do the opposite.

So I have three main takeaways. First, the spring clock change to Daylight Saving Time is bad, but permanent Daylight Saving Time is worse.

Second, year-round Standard Time is the natural, healthy choice promoting physical health, mental health, performance, and safety.

Third, history supports that permanent Standard Time is the only viable solution to end seasonal clock change.

So let me elaborate. The majority of Americans do consistently want to lock the clock but have been more inconsistent about how to ditch the switch. But in March, there was a new Gallup Poll that just showed a significant shift in public opinion, with twice as many Americans now supporting permanent Standard Time over permanent Daylight Saving Time. Sixty percent of Americans and 80 percent of teens do not get the recommended amount of sleep, so there is a lot of room to improve sleep.

Think about how you or your children feel after a bad night of sleep. Maybe you forgot an important meeting, drifted out of your lane, eaten that extra bowl of ice cream. I know I have done those things. You may have struggled to get your teenager out of bed, or been a little short with your husband.

Now instead, think about how much better you feel and function after a good night's sleep. Permanent Standard Time would give more Americans the opportunity to improve their sleep without even trying. The sun is one of the most powerful drivers of health and well-being, but the timing of sunlight is what is critically important. Without enough morning light or with too much evening light, our circadian rhythms delay. This disrupts our sleep patterns and our body and brain functions.

Permanent Daylight Saving Time would cause sunrises after 8 a.m. for two to four months every winter, depriving us of this critical morning light. This is why permanent Daylight Saving Time would be exponentially worse than seasonal Daylight Saving Time.

The adverse effects are greatest in our children, our teenagers, and other night owls whose bodies' clocks already run late. As discussed, there are many harmful benefits that occur in the days after this change, especially in the spring, to Daylight Saving Time, including more strokes and heart attacks. As highlighted in the prior testimony, brain function is really affected by sleep. And so, we heard about judges making harsher statements.

However, these harms do not mean that permanent Daylight Saving Time would be better. Instead, the later sunrises and sunsets of Daylight Saving Time lead to higher risks of chronic diseases including, but not limited to, cancer, diabetes, heart disease, obesity, and these outweigh the short-term risks of what happens with the time change.

There is also data that says that permanent Standard Time also results in better mental health outcomes, including reducing rates of depression and suicide, this is not surprising, as morning light and healthy sleep are known treatments for depression. On the

other hand, poor sleep increases the risk of drug use, alcohol use, and other risk-taking behaviors.

There are some misconceptions I want to address. As discussed, permanent Daylight Saving Time does not make days longer, nor is it the reason why people feel better in the summer. Instead, permanent Daylight Saving Time is a hidden mandate to wake Americans up an hour earlier rather—to their alarm clocks rather than the sun.

If we called it the "Go to Work an Hour Earlier Act" rather than the "Sunshine Protection Act", no one would be voting for it. Permanent Daylight Savings Time does not increase overall exercise levels in the U.S., and even if some people exercise more, obesity, and heart disease, these chronic diseases are still more prevalent.

There is no—while darkness comes with health and safety risks, Daylight Saving Time is not the solution. There is no data to support that permanent Daylight Saving Time would reduce overall crime or motor vehicle crashes. Instead, later sunrises and sunsets are associated with 20 percent more fatal crashes.

The negative impact of Daylight Saving Time on sleep and our brain health harms the economy, workers, especially those with early start times before 8:30, think of your farmers, your transportation workers, your factory workers are less likely to be productive and efficient. Workplace injuries rise after the transition to Daylight Saving Time, and health care spending increases.

On the other hand, permanent Standard Time improves academic success in our children with higher test scores. Your constituents' utility bills will be lower with permanent Standard Time by reducing heating and cooling costs.

And finally, the U.S. tried and quickly abandoned permanent Daylight Saving Time twice before, most recently in 1974. It just does not work. It will not last. For those that are serious about ending clock changes, permanent Standard Time is the only viable solution.

Please refer to my written testimony for more details. And I am happy to look forward to the questions later.

[The prepared statement of Dr. Johnson follows:]

PREPARED STATEMENT OF KARIN JOHNSON, MD, FAAN, FAASM, PROFESSOR OF NEUROLOGY, UNIVERSITY OF MASSACHUSETTS CHAN SCHOOL OF MEDICINE-BAYSTATE, AMERICAN ACADEMY OF SLEEP MEDICINE, ADVOCACY COMMITTEE MEMBER CO-CHAIR, COALITION FOR PERMANENT STANDARD TIME

Permanent Standard Time: the Naturally Healthy and Lasting Way to End Clock Change

Chairman Cruz, Ranking Member Cantwell, and Distinguished Members of the Senate:

My name is Dr. Karin Johnson. I am a practicing sleep medicine specialist and neurologist at UMASS Chan School of Medicine-Baystate. I received my undergraduate degree from Harvard University and medical degree at University of Chicago. I trained in neurology at Brown University and sleep medicine at Harvard University. My primary focus is clinical sleep medicine. My research centers on how sleep disorders and sleep health impact overall health and brain function. My support for permanent Standard Time stems from my commitment to promoting sleep health and brain health on a larger scale.

Today, I appear in my personal capacity as a sleep medicine physician, a member of the American Academy of Sleep Medicine Advocacy Committee and the Co-Chair of the Coalition for permanent Standard Time. This coalition includes the American

Academy of Sleep Medicine, Sleep Research Society, Society for Research on Biological Rhythms, National Sleep Foundation and the non-profit Save Standard Time. Please note that the views expressed in my testimony do not necessarily reflect those of my employer.

Thank you for inviting me to speak at this important hearing. I commend this committee for thoughtfully considering changes to Daylight Saving Time (DST), particularly in regard to its impact on the health and wellbeing of the American people. I echo President Trump's call to end Daylight Saving Time.[1] Permanent Standard time aligns with his executive order establishing the Make America Healthy commission to protect the wellbeing of the Nation and especially of our children. The Sunshine Protection Act for permanent Daylight Saving Time would do the opposite.

In my professional opinion and that of other scientific and medical societies including but not limited to the American Academy of Sleep Medicine, American Academy of Neurology, and the National Safety Council, permanent Standard Time offers multiple positive benefits for physical and mental health, safety and performance.

My testimony will focus on:

1. *The harms of the spring clock change to Daylight Saving Time and the greater risks of year-round Daylight Saving Time.*
2. *Permanent Standard Time is the natural, healthy choice offering multiple long-term benefits to physical health, mental health, safety and performance.*
3. *History supports year-round Standard Time as the only viable solution to end clock change.*

The majority of Americans have consistently called for an end to seasonal clock changes. Last month, President Trump held off on action, stating that he perceived the public as evenly split on which clock should be made permanent. However, the same week, a national Gallop poll revealed a significant shift in public opinion with twice as many Americans now supporting permanent Standard Time (48 percent) over permanent Daylight Saving Time (24 percent).[2]

Sleep Health: A Pillar of Overall Health and Well-being

Consider how you or your children have felt after a poor night's sleep. Maybe you've missed an important meeting, snapped at your spouse, drifted out of your lane, skipped the gym, or eaten an extra bowl of ice cream. You may have struggled to get an overly tired toddler to behave or have drag your teenager out of bed for school. Contrast that with how much better you feel and function after a restful sleep. Permanent Standard Time would help more Americans experience that improvement by providing a more natural alignment between our social schedules and the sun's cycle every day of the year.

There is a growing understanding among doctors, educators, athletes and mental health professionals that sleep is critical but often underutilized tool for improving overall health. Americans are facing a sleep deprivation epidemic, with 60 percent of adults[3] and 80 percent of teens[4] not getting the recommended amount of sleep. Even small improvements in sleep can significantly boost metabolism, mood, immune function and performance.

High-profile athletes, including Tom Brady, Kirk Cousins, Lebron James, Gabby Thomas, Roger Federer and Justin Thomas have capitalized on this understanding to improve their performance through sleep optimization.[5]

Clock Time Matters

Good sleep is not just the number of hours, but also the timing and quality. Human beings are diurnal (not nocturnal); our bodies crave morning light to wake and evening darkness to sleep. Permanent Standard Time improves sleep health by aligning our clocks more naturally with the sun. Standard Time naturally places the sun directly overhead at noon at the meridian (dotted line) of each time zone. Daylight Saving Time shifts the clock time so that the sun is overhead an hour later.

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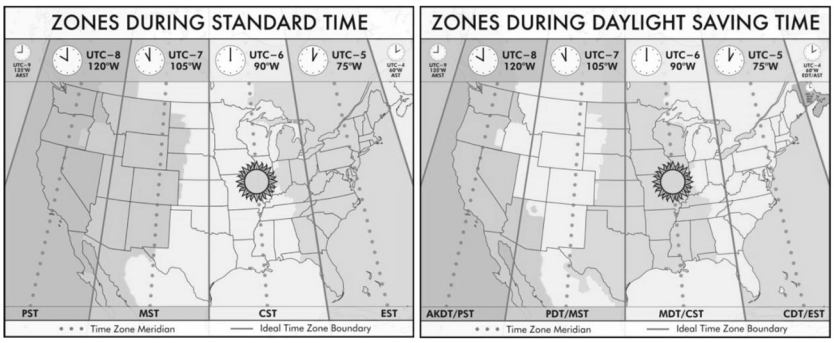
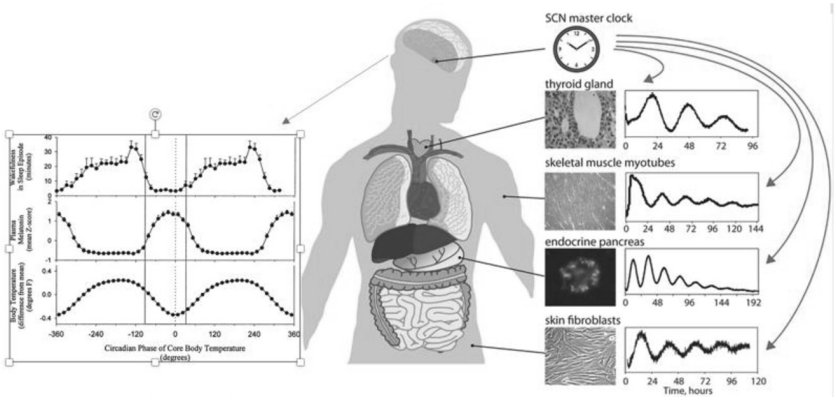
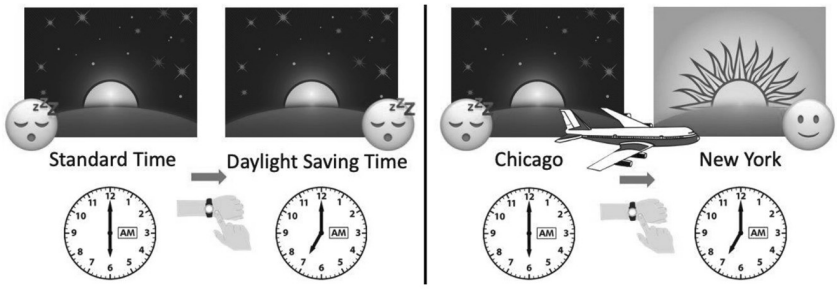
[1] (Bink, 2024)
[2] (Evans & Jones, 2025)
[3] (NationalSleepFoundation, 2025)
[4] (NationalSleepFoundation, 2024)
[5] (Gatto, 2019; Gorman, 2024; Ibach, 2019; Scipioni, 2021; Sekaran, 2023)



Every cell in our body has a biological clock that synchronizes with a master clock in the brain, aligning our circadian rhythms to a 24-hour day.[6] To keep our internal clocks synchronized, most people need morning light and evening darkness. However, Daylight Saving Time stresses the body and brain by continually exposing us to the opposite conditions. Throughout the entire Daylight Saving Time period, our social schedules are misaligned with our natural circadian rhythms. This makes it harder to sleep and wake, and it strains metabolic and neurological functions.

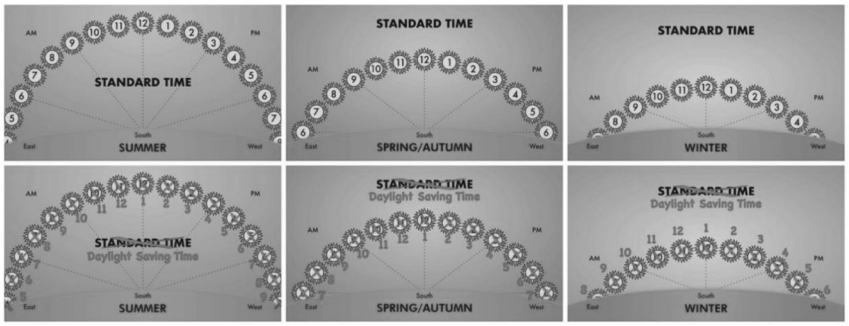


The effects of circadian misalignment are familiar to many of us during flights across time zones. With conventional jetlag, new timing of sunrise at our destination resynchronizes our internal rhythms to the local environment within a few days. However, with Daylight Saving Time our circadian hormones levels (such as the natural morning release of wakefulness-promoting cortisol) remain more aligned to the sun.[7] Chronobiologists refer to this condition as "social jet lag".

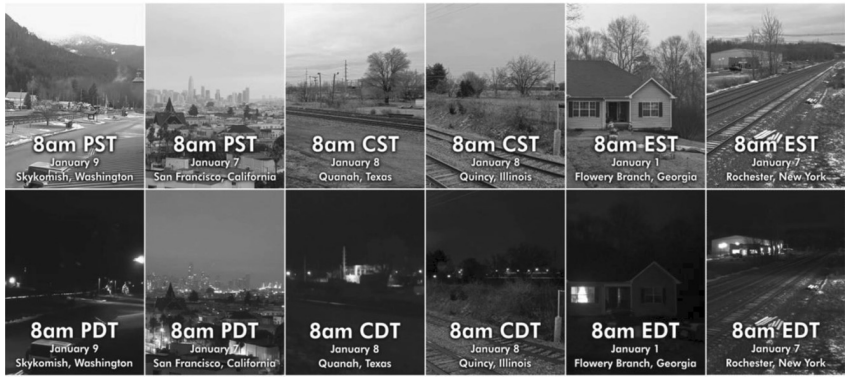


[6] Picture adapted from (Saini, Brown, & Dibner, 2015) and (Dijk & Lockley, 2002)
[7] (Hadlow, Brown, Wardrop, & Henley, 2014)

When our alarms ring at 7 a.m. during Daylight Saving Time, our bodies still feel like it is 6 a.m. near the time zone meridian. On the western edge of the time zone, it feels closer to 5:30 a.m.



When Daylight Saving Time is extended into winter's unavoidably shorter days, it pushes sunrise in most states past 8 a.m. for three or more months, and past 9 a.m in some locations. The long deprivation of crucial morning sunlight is why year-round Daylight Saving Time is exponentially more harmful than seasonal Daylight Saving Time.



Adolescents, teens and young adults have the most circadian disruption from Daylight Saving Time because their body rhythms already run late.[8] Any parent of a teenager knows you can't just tell a kid to go to bed when they aren't tired. This is because before sleep onset, teenagers have the strongest drive for alertness (in what sleep scientist call the "forbidden zone").[9] With more evening light during Daylight Saving Time pushing rhythms even later, most teenagers are biologically unable to get enough sleep before their morning alarms ring. This results in an increased number of teenagers trying to catch up on sleep over weekends,[10] which is associated with numerous adverse health and performance outcomes.[11]

The Harms of the Spring Clock Change to Daylight Saving Time and the Greater Risks of Year-round Daylight Saving Time

The transition from Standard Time to Daylight Saving Time in the spring is particularly harmful (see table below), but year-round Daylight Saving Time is even worse. Our body rhythms never adjust to the later sunrises and sunsets of Daylight Saving Time. These are associated with many long-term risks, including higher

[8] (Crowley, Acebo, & Carskadon, 2007)
[9] (Lavie, 1986)
[10] (Borisenkov *et al.,* 2017)
[11] (Castro *et al.,* 2021; Foster *et al.,* 2013; Haraszti, Ella, Gyöngyösi, Roenneberg, & Káldi, 2014; Levandovski *et al.,* 2011; McGowan, Uzoni, Faltraco, Thome, & Coogan, 2020; Panev *et al.,* 2017; Parsons *et al.,* 2015; Phillips *et al.,* 2017; Roenneberg, Allebrandt, Merrow, & Vetter, 2012)

rates of cancer, obesity, heart attacks, depression, suicide and fatal car crashes.[12] Independent reviews of the literature have resulted in multiple position statements by medical and scientific groups in support of permanent Standard Time.[13]

Health, Safety and Performance Outcomes Worsened by the Spring Clock Change[14]

Sleep disruption	Medical errors
Teen sleep deprivation	Missed appointments
Strokes	Workplace injuries
Heart attacks	Human caused wildfires
Atrial fibrillation	Medical malpractice payments
Autopsies including sudden infant death	Harsher judges sentencing
In-vitro fertilization rate failure	Stock market volatility
Emergency room visits	Alcohol consumption
Motor vehicle accidents	Athletic performance
Suicide	Athletic injuries

Can We Quantify the Short-term Impact?

795,000 strokes /year ~ 15,000 strokes/week. A 3% increase in stroke the week after the time change ~ 450 more strokes/each spring

A study by JP Morgan indicates that the spring shift to Daylight Saving Time is associated with increased financial costs, including a 5.9 percent spike in healthcare spending in Los Angeles compared to Phoenix in the month after the change. (Arizona stays on Standard Time).

Small Sleep Improvements, Big Impacts

We know from later school start time policies that small changes in sleep health can lead to meaningful benefits to health, mood, safety and performance.[15] Permanent Standard Time would allow these benefits without requiring drastic changes. Whereas permanent DST would change the recommended school start time from 8:30 a.m. to 9:30 a.m.

Daylight Saving Time Impacts Certain Populations More

- Teenagers and other night owls
- People with work or childcare start times before 8:30 a.m. (the median work start in the United States is 7:55 a.m.)
- People who live on the western edge of time zones

Corrections of Common Misconceptions

- Daylight Saving Time does not make days longer
- Summer benefits health and mood due to its longer daylength and warmer weather, not due to Daylight Saving Time.
- Studies fail to show permanent Daylight Saving Time significantly increases exercise in the United States.[16] Even if some people exercise more, the risk of chronic health disorders increases due to sleep and circadian disruption.
- While darkness may come with health and safety risks, Daylight Saving Time is not the solution, because sleep and circadian disruption cause even more health and safety risks.

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[12] (Borisenkov *et al.,* 2017; Gentry, Evaniuck, Suriyamongkol, & Mali, 2022; Gu *et al.,* 2017; D. J. Reis *et al.,* 2023; T. VoPham *et al.,* 2018)

[13] (Crawford *et al.,* 2024; Malow, 2022; Medicine, 2022; Roenneberg *et al.,* 2019)

[14] (Kantermann, Juda, Merrow, & Roenneberg, 2007; Lahti *et al.,* 2006) (Kolla, Coombes, Morgenthaler, & Mansukhani, 2021; Medina, Ebben, Milrad, Atkinson, & Krieger, 2015) (Barnes & Wagner, 2009; Ellis, Luther, & Jenkins, 2018; Holland & Hinze, 2000; Sipila, Ruuskanen, Rautava, & Kyto, 2016) (Kountouris, 2020; Manfredini *et al.,* 2019) (Chudow *et al.,* 2020) (Cho, Barnes, & Guanara, 2017; Gao, Lage, & Scullin, 2024; Kamstra, Kramer, & Levi, 2010) (Heacock *et al.,* 2022) (Coate & Markowitz, 2004; Ferguson, 1996; Neumann & von Blanckenburg, 2025; Teke *et al.,* 2021) (O'Connor & Kancheva, 2022; Yule, Krishna, Rahiri, & Hill, 2016)

[15] (K. Wahlstrom *et al.,* 2014) (Later; McKeever, Dodd, & O'Sullivan, 2022) (K. L. Wahlstrom, Berger, & Widome, 2017) (Danner & Phillips, 2008; Temkin, Princiotta, Ryberg, & Lewin, 2018)

[16] (Goodman, Page, Cooper, & International Children's Accelerometry Database, 2014; Zick, 2014)

- Permanent Standard Time results in fewer long-term mental health disorders, reducing seasonal depression[17] and suicide.[18] A 2025 study found that artificial delay of sunrises and sunsets is associated with a roughly 6 percent increase in the incidence of depression.[19] This is not surprising, as morning light and healthy sleep are known treatments for mental health disorders.
- There are no data to support that permanent Daylight Saving Time would reduce year-round crime or motor vehicle crashes, there are only data to support short-term effects after the clock change. Moreover, a recent study spanning eleven years of data across the Nation showed that artificial delay of sunrises and sunsets is associated with 21.8 percent more fatal crashes.[20] Furthermore, sleep disruption is associated with drug and alcohol use, poorer judgment, more risk-taking behaviors and greater aggression—all of which are risk factors for criminality and for vehicular accidents.
- Farmers historically have supported permanent Standard Time. Many aspects of farm and ranch work remained aligned to the sun, for example, the time dew clears from the fields and the circadian rhythms of farm animals. Animals are also impacted by clock changes, becoming less active after sunrise after the transition to Daylight Saving Time.[21] Rural areas were particularly affected in 1974 when people were made to commute to work in the dark and send their kids to school in the dark during permanent Daylight Saving Time.
- Night owls often express a preference for Daylight Saving Time, believing later sunrise and sunsets align better with their natural rhythm. However, their circadian rhythms are more sensitive to the delayed light exposure of Daylight Saving Time.[22] When night owls miss morning light or get exposed to too much light in the evening, their internal body clocks have a greater degree of misalignment with the external environment than people with earlier sleep timing preferences, or "chronotypes". This misalignment is called "social jet lag", and it is associated with chronic health risks, including higher rates of obesity, depression, and cardiovascular problems.[23] Night owls are also more likely to experience greater sleep loss after the seasonal clock change to Daylight Saving Time.[24] One of the most effective medical treatments for helping night owls to wake on time for work and school is high-intensity morning light exposure.[25] Morning light helps reset their circadian rhythms, making it easier to wake up earlier and feel more aligned with the typical work day. Permanent Standard Time would not only help night owls rise without the harshness of an alarm clock, but also support healthier sleep cycles, making it easier for them to fall asleep earlier. The mental and physical health benefits of permanent Standard Time are greater for night owls.
- The negative impact of Daylight Saving Time on sleep harms the economy. Workers, especially those with early start times before 8:30 a.m., are less likely to be productive and efficient during periods of circadian misalignment.[26] Permanent Standard Time improves academic success with higher high school test scores than even seasonal Daylight Saving Time.[27] Additionally, health care bills and work-place injuries rise after the transition to Daylight Saving Time and utility bills, heating and cooling costs are lower during Standard Time.[28]

Historical Context and the Case for Permanent Standard Time

Prior to 1966, most states enjoyed permanent Standard Time for eight decades outside of wartime. It was only after the Uniform Time Act was enacted, with its prescribed adherence to seasonal Daylight Saving Time, that most states began to observe biannual clock changes. Permanent Daylight Saving Time has been tried before, notably during World War II and the 1974 Oil Crisis, but it was quickly aban-

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[17] (Borisenkov *et al.,* 2017)
[18] (D. J. Reis *et al.,* 2023)
[19] (Argys, Averett, & Yang, 2025)
[20] (Gentry *et al.,* 2022)
[21] (Nagendran, Li, Samson, & Schroeder, 2025)
[22] (C. Reis *et al.,* 2023)
[23] (Fárková, Smotek, Bendová, Manková, & Kopřivová, 2021) (Fischer & Lombardi, 2022) (Juda, Vetter, & Roenneberg, 2013) (McMahon *et al.,* 2019) (Owens, Dearth-Wesley, Herman, & Whitaker, 2019) (Merikanto *et al.,* 2013) (Urbán, Magyaródi, & Rigó, 2011) (Wong, Hasler, Kamarck, Muldoon, & Manuck, 2015)
[24] (Putilov, Poluektov, & Dorokhov, 2020)
[25] (Narala, Ahsan, Ednick, & Kier, 2024)
[26] (Giuntella & Mazzonna, 2019)
[27] (Gaski & Sagarin, 2011)
[28] (Barnes & Wagner, 2009; Depalo, 2023; Farrell, Narasiman, & Ward Jr., 2016; Kotchen & Grant, 2011)

doned due to its unpopularity and negative effects. Permitting states to adopt permanent Daylight Saving Time could create significant economic and logistical issues, especially for industries like transportation and broadcasting. Prevention of such problems was why the Uniform Time Act of 1966 was enacted.[29] For example, it has been estimated that companies spend $350 million dollars in computer fixes to deal with Daylight Saving Time transitions.[30] Thus, a national or at least regional approach, with adequate preparation time and careful choice of the most sustainable permanent clock, is preferred.

A recent review disproves the claimed energy savings of Daylight Saving Time,[31] including studies showing utility bills increase during Daylight Saving Time, due to higher heating and cooling costs.[32]

Only about 70 countries currently have seasonal Daylight Saving Time policies, with most countries following year-round Standard Time. Mexico most recently adopted year-round Standard Time in 2022. Permanent Standard Time has been shown to be a lasting option, whereas permanent Daylight Saving Time in the United States and elsewhere has been unsustainable.

Conclusion

In summary, while seasonal Daylight Saving Time allows for more evening light, it forces unpopular, costly and harmful biannual clock changes.

Permanent Standard Time offers a balanced approach that aligns with our natural circadian rhythms, improves health, safety, and productivity, and eliminates the harmful and unpopular effects of seasonal clock changes. While Daylight Saving Time may seem beneficial on the surface, it brings substantial costs to our well-being and inefficiencies to our economy. I urge this committee to consider the long-term benefits of adopting Permanent Standard Time.

Additional Information About Seasonal Transition Effects

Studies of motor vehicle crashes after clock changes have shown varying results,[33] but one study that analyzed data over ten years found the spring transition to Daylight Saving Time likely increases fatal motor vehicle crashes, with a 6 percent rise in fatalities reported. This risk is most significant in the western edges of time zones, where circadian disruption is greatest.[34]

Hansen et al's often-cited study showed an 11 percent increase in depression episodes after the fall transition from Daylight Saving Time to Standard Time, but the rates then decreased over the next two months during Standard Time. This suggests a short-term worsening after the change, and a long-term protective effect of Standard Time, despite shortening day lengths.[35] However, other types of studies are needed to inform the long-term effects. For example, one study that compared permanent Daylight Saving Time to permanent Standard Time found highest rates of seasonal depression during permanent Daylight Saving Time.[36] Another study found a 6 percent higher incidence of depression with later sunrises and sunsets.[37]

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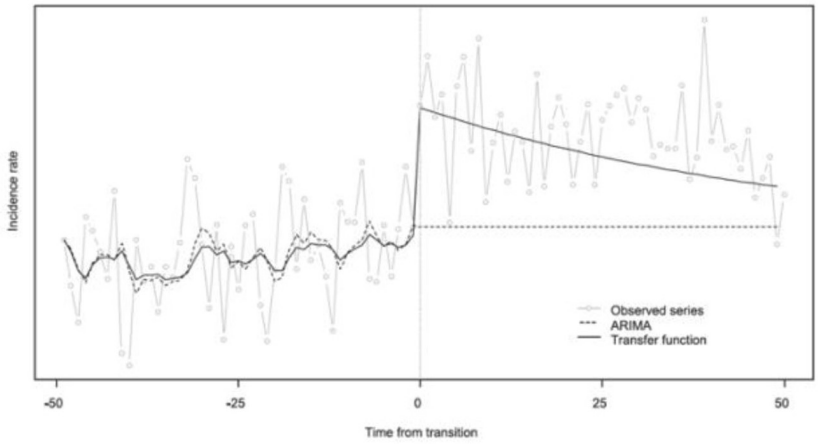
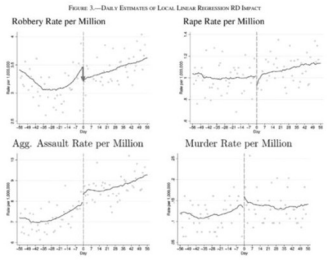
[29] (United States. Congress. House. Committee on Interstate and Foreign Commerce., 1973)
[30] (Lohr, 2007)
[31] (Neumann & von Blanckenburg, 2025)
[32] (Farrell *et al.,* 2016; Kotchen & Grant, 2011)
[33] (Coate & Markowitz, 2004; Ferguson, 1996; Goodwin, Gonzalez, & Fontenla, 2024; Neumann & von Blanckenburg, 2025; Teke *et al.,* 2021)
[34] (Fritz, VoPham, Wright, & Vetter, 2020)
[35] (Hansen, Sonderskov, Hageman, Dinesen, & Ostergaard, 2017)
[36] (Borisenkov *et al.,* 2017)
[37] (Argys *et al.,* 2025)



Doleac et al's often-cited study reported a 27 percent drop in robberies occurring in the two hours around and after sunset after the spring Daylight Saving Time to Standard Time transition.[38] Their data supports an acute effect of light on decreasing robbery rates, but it is unlikely crime rates would be lower overall with permanent Daylight Saving Time when sleep factors are taken in account. In fact, their data shows more crimes were committed during DST period, per their table below.

TABLE 1.—AVERAGE CRIMES PER MILLION POPULATION FOR THE THREE WEEKS BEFORE AND THREE WEEKS AFTER DAYLIGHT SAVING TIME

		All Day	
Crime Rate per Million	Total	Pre-DST	Post-DST
Robbery	3.286	3.192	3.381
	(8.816)	(8.696)	(8.933)
Rape	1.046	1.036	1.056
	(5.222)	(5.251)	(5.192)
Aggravated assault	8.747	8.193	9.300
	(16.996)	(16.254)	(17.69)
Murder	0.141	0.142	0.140
	(1.631)	(1.634)	(1.628)
Year		2005	2006
Total population (1,000,000)	–	22.998	23.194
Total reporting Jurisdictions			



Data Informing the Long-term Impact of Clock Time Choice

Sleep Effect of 1-hour Earlier Sunset and Sunrise on Working Adults in US[39]

Social Factor	Average Daily Sleep Gain
Employed Adults	19 minutes
Work-start before 7 a.m.	36 minutes
Parents of children with school start time before 8 a.m.	27 minutes
Work-start after 8:30 a.m. without children	No change

Social Jet Lag (sleeping in >2 hours later on weekends) is less common in adolescents with permanent Standard Time[40]

EXERCISE

- No change in average exercise in U.S. adolescents with later sunsets[41]

[38] (Doleac & Sanders, 2015; Munyo, 2018)
[39] (Giuntella & Mazzonna, 2019)
[40] (Borisenkov *et al.,* 2017)
[41] (Goodman *et al.,* 2014)

- Comparing Arizona to nearby states, Daylight Saving Time doesn't increase adult physical activity, but it may change the time of day that exercise occurs[42]

HEALTH

- Childhood obesity rates decrease with less social jet lag[43]
- Fewer cases of being overweight or obese with 1-hour earlier sunrise/sunset[44]
- More sun-aligned clock time is associated with lower rates of cancer, heart attacks, coronary artery disease and diabetes[45]
- Health care costs are lower with both stopping clock transitions and more sun-aligned clock time[46]

MENTAL HEALTH

- While people can feel mood brighten when going out in the sun, the timing of light and quality of sleep are more important for long-term mental health
- Morning light-box treatment improves mood;[47] Standard Time naturally provides morning light
- 6 percent higher incidence of depression with later sunrise and sunset[48]
- 1–2/100,000 more suicides with later sunrise and sunset;[49] more aligned clocks could prevent about 5,000 suicides per year
- Sleep and circadian disruption is associated with increased substance abuse[50]
- Winter depression rates are highest during permanent Daylight Saving Time and lowest during permanent Standard Time[51]

Real-world Trials Abroad

Policy	Years	Rate of Winter Depression
Seasonal DST	Pre-2011	8.33%
Permanent DST	2011-2014	9.33%
Permanent ST	Post 2014	7.13%

Can We Quantify the Difference Between Permanent DST and Permanent ST?

Given 42.9 million adolescents in the United States and prevalence rate of seasonal depression in adolescents of 1.7–5.5%, a 2.2% difference is approximately 16,000–52,000 fewer children with seasonal depression during permanent Standard Time than during permanent Daylight Saving Time.

WORKPLACE PERFORMANCE AND SAFETY

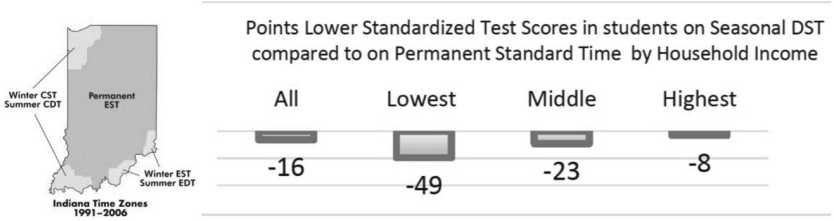
- Many studies demonstrate that sleep and circadian disruption result in worsened brain function, including worsened concentration, attention, reaction time, decision making and learning/memory, affecting workplace relationships, performance and safety[52]

[42] (Zick, 2014)
[43] (Liang *et al.,* 2022)
[44] (Giuntella & Mazzonna, 2019)
[45] (Giuntella & Mazzonna, 2019; Gu *et al.,* 2017; Trang VoPham *et al.,* 2018)
[46] (Co., 2016; Giuntella & Mazzonna, 2019)
[47] (Terman, 2007)
[48] (Argys *et al.,* 2025)
[49] (D. J. Reis *et al.,* 2023)
[50] (Hasler *et al.,* 2017; Hasler *et al.,* 2022)
[51] (Borisenkov *et al.,* 2017)
[52] (Barnes, 2012; Barnes, Ghumman, & Scott, 2013; Barnes, Guarana, Nauman, & Kong, 2016; Barnes, Gunia, & Wagner, 2015; Barnes, Lucianetti, Bhave, & Christian, 2015; Díaz-Morales & Escribano, 2015; Gish, Wagner, Grégoire, & Barnes, 2019; Guarana & Barnes, 2017; McGowan *et al.,* 2020; McGowan, Voinescu, & Coogan, 2016; Panev *et al.,* 2017; Scullin, Hebl, Corrington, & Nguyen, 2020; Uehli *et al.,* 2014; Wagner, Barnes, Lim, & Ferris, 2012)

- Later sunrises and sunsets are associated with over $600 million per year in lost productivity due to 4 million lost workdays[53]
- Professions with earlier work start times or shift work schedules, including transportation construction, utility, manufacturing, education and health services, are impacted most

EDUCATION

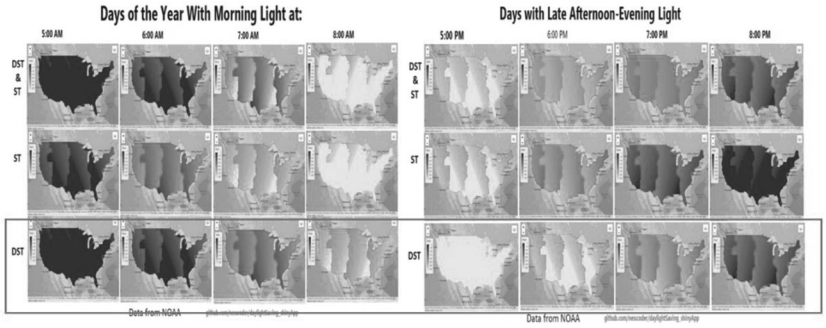
- Students living on permanent Standard Time had higher test scores than those on seasonal Daylight Saving Time[54]



- Academic performance improves when social jet lag is lower[55]

MOTOR VEHICLE CRASHES

- Despite the protective effect of more light during the busier evening commute, driving is less safe during Daylight Saving Time, due to sleep and circadian disruption effects
- 21.8 percent more fatal motor vehicle crashes occur with later sunsets;[56] more aligned clocks could prevent 1,300 more deaths per year
- Driving simulation testing improves throughout Standard Time and worsens throughout Daylight Saving Time[57]
- Permanent Daylight Saving Time has the most total commute time in the dark



[53] (Giuntella & Mazzonna, 2019; Taillard, Sagaspe, Philip, & Bioulac, 2021)
[54] (Gaski & Sagarin, 2011)
[55] (Haraszti *et al.,* 2014)
[56] (Gentry *et al.,* 2022)
[57] (Orsini, Zarantonello, Costa, Rossi, & Montagnese, 2022)

Permanent DST Risked Lives & Business in 1974

Schoolgirl Hurt; Accident Blamed On Time Change

Exemption From DST Is Wanted

Children's deaths spur bid to repeal daylight saving

Girl, 6, Critically Injured in Accident

It Is Daylight Disaster Time

DST BRINGS SWITCH

Road Crews Start One Hour Later

School children, workers

Daylight saving move leaves many in dark

The People Speak

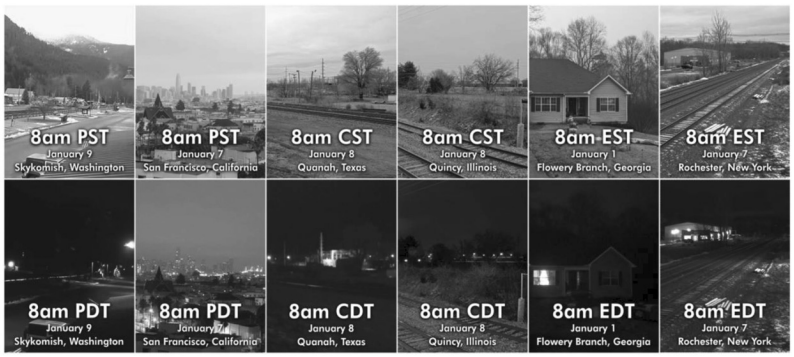
School Children Exposed to Danger

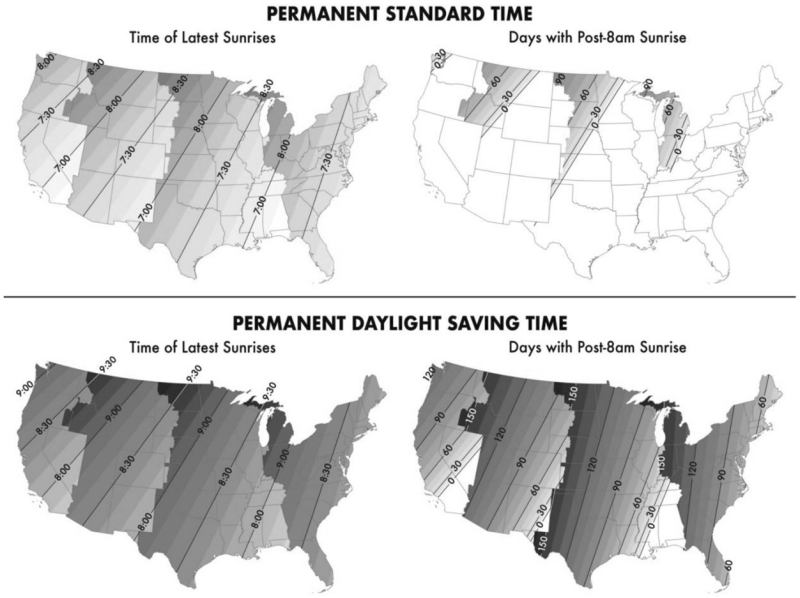
Praise Electricity

Change Backwards

Sunrise Times on Permanent Daylight Saving Time

City	First Day with Sunrise After 8 AM	Last Day with Sunrise After 8 AM	Latest Sunrise
Anchorage, AK	Sept 28	Mar 20	11:16 AM
Atlanta, GA	Nov 4	Mar 7	8:44 AM
Boston, MA	Dec 6	Jan 31	8:14 AM
Charleston, WV	Nov 7	Feb 28	8:45 AM
Chattanooga, TN	Oct 29	Mar 10	8:51 AM
Cheyenne, WY	Nov 25	Feb 11	8:26 AM
Chicago, IL	Dec 1	Feb 4	8:19 AM
Cleveland, OH	Nov 1	Mar 2	8:54 AM
Denver, CO	Nov 28	Feb 9	8:22 AM
Detroit, MI	Oct 27	Mar 6	9:02 AM
Helena, MT	Oct 24	Mar 5	9:13 AM
Honolulu, HI	every day of the year		8:12 AM
Indianapolis, IN	Oct 19	Mar 13	9:07 AM
Jackson, MS	Dec 23	Jan 23	8:03 AM
Kansas City, KS	Nov 12	Feb 23	8:39 AM
Madison, WI	Nov 22	Feb 12	8:30 AM
Minneapolis, MN	Nov 6	Feb 24	8:52 AM
Pierre, SD	Oct 17	Mar 12	9:18 AM
Raleigh, NC	Nov 23	Feb 17	8:26 AM
Reno, NV	Nov 29	Feb 8	8:21 AM
Salt Lake City, UT	Nov 2	Mar 2	8:53 AM
San Antonio, TX	Nov 16	Mar 2	8:30 AM
San Francisco, CA	Nov 24	Feb 15	8:26 AM
Santa Fe, NM	Dec 5	Feb 6	8:15 AM
Seattle, WA	Nov 5	Feb 24	8:58 AM
St. Louis, MO	Nov 30	Feb 8	8:20 AM
Tallahassee, FL	Nov 11	Mar 5	8:36 AM
Trenton, NJ	Nov 27	Feb 9	8:22 AM
Wilmington, DE	Nov 26	Feb 11	8:24 AM





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The CHAIRMAN. Thank you very much.

Dr. Harkey.

STATEMENT OF DR. DAVID HARKEY, PRESIDENT, INSURANCE INSTITUTE FOR HIGHWAY SAFETY

Dr. HARKEY. Chairman Cruz, Ranking Member Blunt Rochester, and members of the Committee, thank you for the opportunity to share the IIHS research on the road safety implications of Daylight Saving Time.

When discussing any topic on road safety in the United States it is important to set the stage. Simply put, we are in a road safety emergency. Crash deaths have risen nearly 30 percent since 2014, from below 33,000 to more than 42,000 in 2022. Pedestrian crashes in particular have reached crisis levels, climbing more than 80 percent from their low point in 2009.

Changing the clocks twice a year is relevant to road safety first and foremost because it affects the amount of ambient light during peak times for travel. We know that darkness is associated with increased risk of fatal crashes. We do about a quarter of our travel at night, but nearly half of motor vehicle occupant deaths and three-quarters of pedestrian deaths occur in the dark.

Obviously, adjusting the clock cannot increase the number of daylight hours but can only shift how they align with work and school schedules.

Since people travel at all times of day, and the risk created by darkness varies by road user type, the effects of these time changes on crashes are complex. The aim of our recent study was to examine the effect of changes in light conditions associated with the beginning and end of Daylight Saving Time. We examined 10 years of fatality data for the 5-weeks before and after each time change and only considered crashes between 4 a.m. and 10 a.m., and between 3 p.m. and 9 p.m. Ambient light conditions were calculated using the sunrise and sunset times corresponding to the geographic coordinates of each crash.

Crashes resulting in vehicle occupant deaths fell 7 percent in the 5-weeks after the time change in the fall and increased 12 percent in the 5-weeks after the time change in the spring. The opposite was true for crashes resulting in pedestrian or bicyclist deaths. Those crashes rose 13 percent in the fall, and declined 24 percent in the spring. The net effect was 26 fewer morning and evening crashes with pedestrian or bicyclist fatalities per year, and 29 addi-

tional morning and evening crashes with vehicle occupant fatalities.

It is important to emphasize that our study does not point to a preference for Standard Time or Daylight Saving Time based on road safety alone. The clearest take away from this research is that there is a strong relationship between increased darkness and fatal crashes, particularly for pedestrians and bicyclists. This is consistent with previous studies, including our own work from 30 years ago examining the effects of Daylight Saving Time.

While the clock may not hold the answer to our road safety crisis, there are known solutions for protecting pedestrians in dark and low-light conditions, and for reducing the crash toll overall. We should commit to infrastructure and vehicle improvements that have been shown to increase safety for pedestrians and bicyclists on different types of roadways in urban, suburban, and rural environments.

This includes engineering treatments to improve motor shielding behavior, and vehicle technologies such as better headlights and automatic emergency braking.

Efforts are also needed to address speed on our roadways. The speed effect on crash severity is more pronounced for pedestrians and bicyclists who do not have the benefit of the vehicle structure to protect them. Speed limit policy, enforcement, engineering, and vehicle technology all have a role to play in slowing down drivers. Such a multipronged strategy to improve pedestrian and bicyclist safety at night exemplifies the safe system approach, which the U.S. DOT has adopted as the guiding paradigm of the National Roadway Safety Strategy. But implementation has simply been too slow.

We are alarmed by the rising toll of crashes on our Nation's roads and dismayed by the lack of urgency to fix the problem. For this reason, we recently launched an initiative we are calling 30x30, a goal to reduce U.S. fatalities 30 percent by 2030. Achieving this reduction will require concerted effort by all stakeholders. We will increase our efforts to address risky behaviors, seek opportunities to improve safety for everyone inside and outside the vehicle, and explore ways to make commercial vehicle fleets safer.

We ask everybody who cares about the needless loss of life on our roadways, including this committee, to think about what they can contribute to achieving the 30x30 goal.

Thank you.

[The prepared statement of Dr. Harkey follows:]

PREPARED STATEMENT OF DAVID HARKEY, PRESIDENT,
INSURANCE INSTITUTE FOR HIGHWAY SAFETY (IIHS)

Chairman Cruz, Ranking Member Cantwell, and Members of the Committee—thank you for the opportunity to share my organization's research on the road safety implications of daylight saving time.

The Insurance Institute for Highway Safety (IIHS) is an independent, nonprofit scientific and educational organization dedicated to reducing deaths, injuries and property damage from motor vehicle crashes through research and evaluation and through education of consumers, policymakers, and safety professionals. Our work is wholly supported by U.S. and Canadian auto insurers.

When discussing any topic on road safety in the United States, it is important to set the stage. Simply put, we are in the middle of a road safety emergency. Crash deaths have risen nearly 30 percent since 2014, from below 33,000 to more than

42,000 in 2022. Pedestrian deaths, in particular, have reached crisis levels, climbing 83 percent from their low point in 2009.

Changing the clocks twice a year is relevant to road safety first and foremost because it affects the amount of ambient light during peak times for travel. We know that darkness is associated with increased risk of fatal crashes. According to data from the National Highway Traffic Safety Administration and the Federal Highway Administration, less than a quarter of trips begin during nighttime hours, but nearly half of motor vehicle occupant deaths and 77 percent of pedestrian deaths occur in the dark. Obviously, adjusting the clock cannot increase the number of daylight hours, but can only shift how they align with work and school schedules. Since people travel at all times of day and the risk created by darkness varies by road user type, the effects of these time changes on crashes are complex.

IIHS sought to tease out some of this complexity in a recent study.[1] When we looked at morning and evening crash patterns in the weeks surrounding the time changes, we found that the current policy results in a net annual decrease of 26 crashes with pedestrian or bicyclist fatalities per year but a net annual increase of 29 crashes with vehicle occupant fatalities. Safety improves for pedestrians after "springing ahead," while vehicle occupants fare better after "falling back." Further investigation showed that the fluctuation in pedestrian crash deaths is clearly tied to the amount of ambient light, but there is no clear connection for vehicle occupant fatalities.

If you are looking for concrete guidance on whether to keep the current twice-yearly time changes, to make daylight saving time permanent, or to abolish it completely, you may find this study unsatisfying, as the evidence does not point definitively one way or another. What our study does reinforce is that pedestrians and bicyclists are at greater risk in low light and dark conditions. Thus, whatever you decide to do about the clock, I hope you will also consider actions to keep pedestrians and bicyclists safe, especially after sundown.

IIHS study of daylight saving time

The aim of our recent study was to examine the effect of changes in light conditions associated with the beginning and end of daylight saving time, rather than the short-term sleep disruption associated with changing the clock. IIHS researchers looked at data from the U.S. Department of Transportation's Fatality Analysis Reporting System for the 5 weeks before and after each time change from 2010 through 2019. Only crashes between 4 a.m. and 10 a.m. and between 3 p.m. and 9 p.m. were considered. Ambient light conditions were calculated using the sunrise and sunset times corresponding to the geographic coordinates of each crash.

Crashes resulting in vehicle occupant deaths fell 7 percent in the 5 weeks after the time change in the fall and increased 12 percent in the 5 weeks after the time change in the spring. The opposite was true for crashes resulting in pedestrian or bicyclist deaths. Those crashes rose 13 percent in the fall and declined 24 percent in the spring.

As mentioned, the net effect was 26 fewer morning and evening crashes with pedestrian or bicyclist fatalities per year and 29 additional morning and evening crashes with vehicle occupant fatalities.

When we looked at the time of day when the crashes occurred and the associated light conditions, we found that all of the decrease in pedestrian fatalities could be attributed to an increase in the amount of light, while only two of the additional crashes resulting in vehicle occupant deaths were due to less light.

It's unclear why the effect of the time change on vehicle occupant fatalities was opposite of the effect on pedestrians. The results suggest that unlike the effect on pedestrians, the vehicle occupant effect was largely unrelated to light conditions. It's possible that factors including driver drowsiness or behavioral changes in response to the time changes played a role, but our study did not examine those things.

It is important to emphasize that our study does not point to a preference for standard time or daylight saving time based on road safety alone. In addition to the diverging results for different road user groups, we should keep in mind that an extra hour of light on one end of the workday is counterbalanced by an extra hour of darkness on the other end.

The clearest takeaway from this research is that there is a strong relationship between increased darkness and fatal crashes, particularly for pedestrians and bicyclists. This is consistent with previous studies, including our own work from 30 years ago examining the effects of daylight saving time.[2]

Improving safety after dark

While the clock may not hold the answer to our road safety crisis, there are known solutions for protecting pedestrians after dark and for reducing the crash toll overall.

First of all, we should commit to infrastructure and vehicle improvements that have been shown to improve safety for pedestrians and bicyclists on different types of roadways in urban, suburban, and rural areas. Our research has shown that crosswalk lighting, rectangular rapid flashing beacons, and pedestrian hybrid beacons all make drivers more likely to yield to pedestrians.[3,4] Improved headlights are also key, allowing drivers to detect pedestrians further down the roadway. Vehicles with good marks for visibility in IIHS headlight evaluations have 23 percent fewer nighttime pedestrian crashes than vehicles with poor-visibility headlights.[5]

Our work on passenger-vehicle automatic emergency braking that can detect and respond to pedestrians shows that this technology cuts pedestrian crash rates 27 percent.[6] In the last few years, automakers have been improving the performance of these systems at night in response to IIHS tests. Making these systems work better at night is key to addressing the three-quarters of pedestrian fatalities that occur in dark and low-light conditions.

Efforts are also needed to address speed on our roadways. Higher vehicle speeds make crashes of all types more likely and more deadly. The speed effect on crash severity is more pronounced for pedestrians and bicyclists, who don't have a vehicle's structure to protect them. In one study of U.S. pedestrian crashes, the average risk of severe injury to a pedestrian increased from 10 percent at an impact speed of 17 mph to 25 percent at 25 mph, 50 percent at 33 mph, 75 percent at 41 mph, and 90 percent at 48 mph.[7]

Reducing speed limits, especially in areas with high pedestrian traffic, is an obvious solution. Enforcement must also play a role, and traditional methods can be supplemented by the wider use of speed safety cameras. Engineering measures such as curb bulb-outs, multiway stop signs, left-turn hardening devices, and roundabouts could be more widely deployed to slow vehicles at intersections. Broader adoption of intelligent speed assistance in vehicles could change drivers' behavior and even their mindset.[8]

Addressing the larger road safety crisis

Such a multipronged strategy to improve pedestrian and bicyclist safety at night exemplifies the Safe System approach, which the U.S. Department of Transportation has adopted as the "guiding paradigm" of the National Roadway Safety Strategy.[9] While the Department should be commended for committing to this principle, little progress has been made to translate it into action and reverse the Nation's fatality trend.

We at IIHS are alarmed by the rising toll of crashes on our Nation's roads and dismayed by an apparent lack of urgency to fix the problem. For this reason, we recently launched an initiative we are calling 30x30—a goal to reduce U.S. fatalities 30 percent by 2030.[10] Achieving this reduction will require a concerted effort by all stakeholders. For our part, IIHS has laid out a series of concrete research, testing, and education actions that we are undertaking as part of our 5-year strategic plan. We will increase our efforts to address risky behaviors, seek opportunities to improve safety for everyone inside and outside the vehicle, and explore ways to make the country's heavy and light commercial vehicle fleets safer. We ask everybody who cares about the needless loss of life on our roads—including this Committee—to think about what they can contribute to achieving the 30x30 goal.

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STATEMENT OF HON. JOHN CURTIS, U.S. SENATOR FROM UTAH

Senator CURTIS [presiding]. Thank you. You will notice the freshmen have taken over this committee.

[Laughter.]

Senator CURTIS. And we have an agenda, don't we? Yes.

Listen, I am pleased to be here. John Curtis from Utah, and thank you, panel, for this important topic, and I think it is fair to say that my constituents share the same frustration that has been articulated here by the back and forth.

Mr. Yates, you mentioned in your testimony that the only reason we still have this time change every 6 months is due to the Federal Government's inability to decide between Standard or Daylight Savings Time, which one is best. Based on your research and your outreach, do you have any indication how many states would opt out and maintain permanent Standard Time if your proposal for permanent Daylight Savings Time were enacted?

Mr. YATES. Thank you, Senator, for the question. I do not have a specific answer. I can talk to you about some of the conversations that I have had with state legislators, including, I do not know if you know Dr. Raymond Ward in Utah.

Senator CURTIS. Yes. Sure.

Mr. YATES. He was the sponsor of the bill there, and he thought—and he said, all of his constituents told him that the state preferred—that everybody preferred to stay in permanent Daylight Time in Utah. Utah might be a case where Standard Time might be a good option, and that is why I think the 2-year implementation would actually be a great chance for everybody in Utah to look at what the sun——

Senator CURTIS. Well, let me jump. Let us talk about Utah.

Mr. YATES. Sure.

Senator CURTIS. You are correct. They have actually passed legislation to stay on permanent Daylight Savings Time. And I guess my question is, why should not states have the right to make this decision? Don't they know best about what they want for their constituents? And you know, why are not we giving more accommodation to states, and particularly Utah who has spoken so vocally about what they would like?

Mr. YATES. I am sorry, Senator, are you asking is there a way that the states could opt out of?

Senator CURTIS. So my point is——

Mr. YATES. Yes.

Senator CURTIS.—states know what is best for them.

Mr. YATES. Right?

Senator CURTIS. Some states, like Utah, clearly have a preference, and some would go the other way.

Mr. YATES. Yes.

Senator CURTIS. And I guess my question is, now let me tie that into the next question, is we could see a patchwork, which I suspect might be the answer to that. Now, Utah, by the way, we abut Arizona, and so my whole life we have watched Arizona mock us, right, as we all change our times, and somehow we have navigated that just fine, right, without any problem. And then I would also bring up, the technology is in a very different place than it was years ago and our ability to adapt to this.

So do you worry about a patchwork, or are we OK with that?

Mr. YATES. Thank you for the question, Senator. I think that less complexity in the system is better. It is natural to think that there would be a patchwork if we allowed more states to opt into permanent Standard Time, but we have a patchwork now. What we would be creating is less of a patchwork because the lines might change a little bit.

For instance, Indiana, for instance, may decide that it is better for the whole state of Indiana to be in Central Time with Chicago, which it abuts and which is a thousand miles from Boston. And so it would not create a patchwork, it would just create a change in where the line is.

And so the first and most important thing is decreasing and eliminating the clock changing, which decreases complexity. And then once we have got that stability, it will not be a patchwork. It will just be we know what time it is in Indiana, because of all this.

Senator CURTIS. Just the way we have accommodated it too, with Arizona.

Mr. YATES. Exactly.

Senator CURTIS. Right. And if we are honest we, like your point, we already have these lines, and they do just fine with that.

Mr. YATES. Yes.

Senator CURTIS. And so, just for the record, I am a strong advocate to let my state do what they prefer to do. And feel like they know how to make those decisions best.

I am going to use just a little bit of time for actually a very interesting personal question, Dr. Johnson. Given all the effects that we have heard about, what is the likelihood that if somebody had a profession where they were moving across the country twice a week and changing time zones, an hour, or 2 hours, or sometimes 3 hours, that they would be subject to those same problems?

Dr. JOHNSON. So you know, a lot of us can relate to jet lag. One thing that happens with jet lag is you are moving to a new time where the sun is in the sky. And so we adjust to that within a day or two, we get to the new time zone depending on how far we are going. What happens with going to permanent Daylight Savings Time is we are changing the clock time, but we are not changing

the sun. That is why there is this perpetual misalignment that has more stresses and harms to our body over the long run.

So very frequent time travel with a lot of adjust is a big strain on the body; but for most people that do not do it all the time, we do adjust within days, and we can get, you know, that better health and more misalignment—or more alignment of our rhythms within days.

Senator CURTIS. Unless, within days, you are going back to the previous time zone?

Dr. JOHNSON. That is why they are really frequent, not good.

Senator CURTIS. All right. I think I have made my point. I will yield to the Ranking Member.

Senator BLUNT ROCHESTER. Thank you to my fellow freshman and classmate, Senator Curtis. And also thank you to Senator Cantwell for the opportunity to be Ranking Member today. And I also want to thank the witnesses.

You know, this is one of the issues that a lot of times we will get messages from our constituents. People have strong opinions. And I was literally in a meeting before this with a CEO of a company who asked: Well, what do you think? And so this is something that does touch on so many.

And I want to start my questions with you, Dr. Harkey, because year-round Daylight Saving Time would mean later sunrises in the mornings, more people may be commuting to work or into school in the dark. Some people have raised concerns that this would put their children at greater risk of being hit by cars while walking to school. Pedestrians are more likely to be killed in traffic accidents, as you stated, in the dark, because it is harder for the drivers to see them.

And in the 1970s, it was widely reported that mothers raised significant concerns about their children walking to school in the dark in the winter. Nationwide, over 70 percent of fatal accidents involving pedestrians occur at night. Dr. Harkey, no matter what time the sun goes down, what roadway improvements can cities and states make to reduce pedestrian fatalities?

Dr. HARKEY. Thank you for the question, Senator. That is exactly what our study indicated is that it is not about the shifting of the time. We are going to have darkness regardless of which decision you make, which policy decision you make. And so that is what we are looking for, is to try and figure out how do we make pedestrians and bicyclists, in particular, safer in those dark hours, whether they are in the morning or whether they are in the evening.

And for most municipalities and county agencies and state DOTs who are struggling to address this issue, there is two key things: One is space, we have to provide the appropriate space, sidewalks. In rural areas, that can be separated paths, or possibly paved shoulders, even places for people to walk where they are not in the edge of the travel lane.

We also have to take care to provide careful crossings. So we have to pay particular attention to how we are allowing motor vehicles and pedestrians to interact at crosswalks. These can be at intersections. They can be at midblock locations. So you have to have appropriate crossings. Pedestrians are not going to walk too

far. They are going to make those decisions to cross in the middle of the road sometimes, and so you want to make sure that you are providing adequate crossings where they want to cross.

And then you have got to do all you can to provide the kinds of traffic control devices that will increase motorist yielding behavior. So this includes things like rapid flash beacons, which have been shown to increase motorist yielding behavior six-fold. You can build on that. Adding simple things like lights that are triggered when a pedestrian hits the crosswalk area. It will light up that crosswalk. You can double the amount of motorist yielding behavior.

So these are interventions that have been proven over time, and it is important for state agencies and local agencies to take advantage of those kinds of interventions and get those implemented anywhere that they have pedestrians.

Senator BLUNT ROCHESTER. Following along on the safety theme, what vehicle technologies can help protect pedestrians when it is difficult for drivers to see them?

Dr. HARKEY. Yes. And so this is another important aspect, and this is what builds on the safe system approach, right, building that redundancy into the systems. You do not just rely on the infrastructure; you also build technology into vehicles that can help with this.

Two big things that we have studied, one is better headlights. We are the only group in the world that test headlights the way that we do on our track, and so we have seen improvements in headlights over the years that increase visibility and provide drivers with additional time. They can see that pedestrian further down the roadway. And so that is a big change, and we will continue to push for that.

The other is automatic emergency braking with pedestrian detection, that also has been shown to work and be very effective at reducing pedestrian crashes in the daytime, and now our testing is really focused on getting automakers to improve those systems to work even better at nighttime, so that is an example of two technologies in the vehicle that can be really, really beneficial.

Senator BLUNT ROCHESTER. You know, one of the things that I have noticed is that our safety efforts are siloed. You have the Federal Highway Administration, which builds and maintains highways, you have the National Highway Traffic Safety Administration, which regulates vehicle safety standards and investigates defects, then you have got the Federal Motor Carrier Safety Administration, which oversees commercial motor vehicles and trucking industry safety all kind of working separately.

And I think back to what you were talking about, about kind of—how can we better layer safety measures to help stop deadly crashes?

Dr. HARKEY. Yes. You are absolutely right. And so build on top the separation and the Federal agencies that you just discussed, along with them, you have state DOTs, you have county DOTs, you have city DOTs, and so it becomes quite the web of how you make decisions when it comes to road safety.

One of the things that we have to do a better job of is communicating between those agencies, deliberately. And so there is no single authority of the ones that you mentioned that has complete

authority over every decision on our roadway system when it comes to safety. And so these agencies have to do a better job of communicating together deliberately, and not just at the executive level, but at the staff level, because it is at the staff level where people know what interventions work best and how to apply those in a way that you create that redundancy in the system that we were talking about.

So whether it is infrastructure, whether it is vehicle, whether it is changing behaviors, that communication amongst the staff is absolutely critical.

Senator BLUNT ROCHESTER. Great. Thank you. And I was really interested to hear about your 30x30. So in the interest of time, I will yield back to the Chairman.

The CHAIRMAN. Thank you very much, and I want to thank each of the witnesses for being here on what is a very interesting topic, and important topic, and complex topic. There are very real and complicated issues and countervailing arguments on both sides. I think there is widespread agreement on locking the clock, but where to lock it, the reason we are holding these hearings is because these are real arguments, and they have real impacts on people.

Let me start on the health side. Dr. Johnson, can you expand on the impact sleep deprivation has on our overall health, on our minds, our moods, and especially on young children, for whom we know sleep is so vital?

Dr. JOHNSON. Thank you for asking about that. Yes, sleep comes—you know, has different aspects. So one is just how much we sleep, but it is the quality of sleep, and then the timing of sleep, so any disturbance in that can affect how we do. So we know that kids, even if over a whole week they get enough sleep, if they do not get enough during the week and catch up on the weekend, they still do not do as well.

And so sleep and our circadian rhythms, they really regulate every aspect of our body, our metabolism. They affect how we think about things, they affect our choices of food. You are more likely to grab a celery stick when you have got enough sleep, but grab that bagel or that candy bar when you are sleep-deprived.

Athletic performance, we know, is better when people do sleep, academic success in school. And then mental health has some of the most, deep connections to sleep health. And that is why even though people, you know, feel better when they see light, it is that timing of light and our circadian rhythms that is so deeply intertwined that if we can improve sleep, if we can improve those rhythms, we see those lower rates of depression overall. We see lower rates of suicide.

And that is what the data, there was just a new study that came out just last week showing 6 percent higher rates of depression when the sunrises are set later, when we lose that critical morning light. And this gets exponentially worse in the winter when you lose the—you know, the light in the morning.

So Texas and the southern states actually lose that morning light for a longer period because of the curve of the Earth the more even days. You get three to 4 months with it being dark after 8 a.m.,

and some of the darkest places in the country are actually in western Texas if we were to go to permanent Daylight Savings Time.

And that is why in 1974, a lot of the push to end our experiment with Daylight Savings Time was actually pushed by states like Florida, and Texas, and the southern states.

The CHAIRMAN. Can you also explain why consistent sleep patterns are important for teen brain development and mental health?

Dr. JOHNSON. Yes. So again, this goes back to our circadian rhythms, and so better—so when our circadian rhythms are working well, they help us anticipate our day. And so what I mean by that is we have certain times when our body wants to go to sleep, and so teenagers, their natural rhythm is later. If any of you have been around a teenager, you cannot just say: Go to bed, you know, they are like: I am wide awake.

We have this, what we call, a forbidden zone, their alertness just is skyrocketing in that time before bed. And so they cannot get to sleep on time. But if our social schedule is set an hour earlier, which is what Daylight Savings Time does, they do not have that opportunity to get the amount of sleep they need. And they tend to switch back and forth on weekends, and that switching affects us.

And so that then affects how our brain functions. We know more and more about sleep being important for clearing toxins from our brain, which sets us up for things like dementia, Parkinson's disease. I just came back from the neuro conference with data pointing to, you know, the connections there. Our metabolism gets off, so we are more likely to gain weight. Again, even if people do exercise more, we see, like, 10 percent higher rates of obesity in places where the sun sets later.

So sleep is so critically important for our metabolic health, our overall health, our mental health, how our brain functions, which affects the safety issues. You know, the highway study, it found a higher risk of vehicle crashes even though it was light later, the effect of sleep is more powerful than almost anything else, and by aligning the sun we can really help that.

The CHAIRMAN. So let us talk a little bit about the idea of states' rights. And I have heard from groups on both sides of this issue that want either permanent Standard Time or permanent Daylight Savings Time. Almost everyone agrees that changing the clock twice a year does not make sense.

Mr. Yates, in your opening statement, you said that setting the clock is fundamentally a states' rights issue. Why do you think that decision should be left to the states?

Mr. YATES. Thank you for the question, Senator. The main reason is geography, right. Like, we live on this big round ball, and the sun is moving, and the difference in where each state is makes a big difference in how the sunrise and sunset time applies. And so to say that there is one solution that is exactly right for, you know, Texas, and the exact same solution is right for Atlanta, for Georgia is, what I would posit, overreach by the Federal Government.

And I might even go back to the example that is often cited about when the time change happened in the 1970s, and just to give a little context to why that was so—why that was such a fail-

ure, it is often cited that people did not like it because there were children that were put at risk in the dark waiting for school. It turns out, a lot of that is apocryphal, as we have heard, pedestrians are much safer with more light later in the day.

But the thing that is interesting about that time change was, and this shows you how different politics was back in those days, that law was signed into law on December 15, 1973, right in the middle of Watergate. You could say that maybe it was a distraction from other things that were going on, but it was enacted on December 15th, on a Saturday.

It was enacted—it took place on January 6, 1974, about three weeks later. So you can imagine, the worst Monday of the year already is the one after the holiday break, where you have to go back to school and everything, to have an extra hour of sleep robbed away right before that, you can understand why it was so unpopular and why it was repealed two months after Nixon resigned office.

So it clearly does not work for the Federal Government to come and say this is a mandate of exactly what we should do for all of the country all at the same time. But it is the place of the Commerce Committee to say we need a well-regulated time system.

And so it makes sense to get rid of the clock changing, and if we give 2 years to the states to be able to say, so that all of these arguments can be hashed out, and they are all valid arguments, but they can be hashed out in the geography of the place where it would actually apply. And they would have time to plan and figure out what is the appropriate time for school to start, to take in this evidence from neurologists, and what is the best time for all of the businesses to operate.

The CHAIRMAN. So maybe if we had more daylight, the Watergate break-in does not happen, and history would be different.

Dr. Johnson, you seem to disagree with having states decide on how they should lock the clock. In your judgment, why do you think that would be the wrong approach?

Dr. JOHNSON. So time is a measure. So Congress has the control over setting measures. I think of my husband, he likes to make a joke: He is 6'6" in the morning and 6'5" in the afternoon. We do not change the length of a foot on his diurnal pattern of his height. Time is supposed to say, you know, how the sun is moving through the sky.

And so if we set it to a Standard Time of the sun being closer to overhead at noon, now that is something we can go by, but states then can decide how they want to set their social schedules. So instead of sort of tricking people into, you know: You all have to get up early no matter what; let us have each state decide when they want their schools to start, when businesses want to start, but let us fix a measure of time that actually has a meaning, where the sun is overhead, and then adjust, you know, the social schedule around it. And that is definitely something the states should decide on.

The CHAIRMAN. Thank you. Senator Luján.

STATEMENT OF HON. BEN RAY LUJÁN,
U.S. SENATOR FROM NEW MEXICO

Senator LUJÁN. Thank you, Mr. Chairman. Thank you all for being here today.

Dr. Johnson, thank you for joining us today. I saw that the American Academy of Neurology sent the Committee a letter encouraging us to consider that Standard Time, not Daylight Savings Time, is the best to align with our body's natural clocks. Many people still sleep through the morning light or after the early sunrises. Does that mean that light is being wasted if they are not using it awake?

Dr. JOHNSON. So light helps us get up. You know, most people will wake up naturally after light. Now, some people, my teenagers, could easily sleep until noon, and that makes them actually more likely to shift their schedules even later. So when you miss morning light, which is needed to reset your rhythm, or if you get too much light in the evenings, you drift later and have even more trouble getting up in the morning.

And so that is why, if we actually set it so the sun is rising earlier in the morning, more people will actually, naturally, because their circadian rhythms start saying, "get up on time" rather than "get up so late", will be able to be ready for the day, be able to have their circadian rhythms help their health, help their metabolism which is good—going to be good for heart disease, stroke risk, dementia risk, all these other sort of chronic health problems.

Senator LUJÁN. I appreciate that. To all the panelists, what does this mean for New Mexico, for our farmers, school children and teenagers, the elderly, workers, and tourism, and recreation? What would permanent daylight Standard Time or permanent Standard Time mean for these communities? One or the other, I apologize, not an "or"? Mr. Yates?

Mr. YATES. Senator, thank you for the question. New Mexico is another real leader in early movements to try to lock the clock. Senator Cliff Pirtle—State Senator Cliff Pirtle worked on this. I worked with him closely for a long time. The effects on everybody in New Mexico of the clock changing is the same, which is, it is very disruptive, it is not disruptive equally for everybody, but for a lot of people, it is. A lot of—you know, all the things that we have cited, all the different health studies show that.

The thing that I have been advocating today about the two-year implementation period would be especially helpful for New Mexico because you have a tricky little trade region where you abut West Texas, which is in the Mountain Time Zone, and part of Mexico. And so there is a region where interstate commerce is directly affected.

And so all of Mexico recently decided to lock the clock, except for the part that is attached to West Texas and New Mexico, and so these issues of commerce are complicated and do take a little while to work out. So that is the one thing I would say, is that that sort of thing should be addressed carefully.

Senator LUJÁN. Mr. Karen.

Mr. KAREN. I would say that the golf courses in New Mexico, which enjoy mostly afternoon and evening light, all the great hiking that goes on in New Mexico, the rock climbing, the hot air bal-

looning, all of that would be seriously curbed if Daylight Saving Time was removed. And that would be, I think, a detriment to the New Mexico economy and people's time and ability to get outside and enjoy what you have.

Senator LUJÁN. You are suggesting that people hike and golf in the morning?

Mr. KAREN. No, they do all that in the afternoon. And if Standard Time was made permanent, they would feel forced to do it in the morning. But they have to go to school. They have to go to work. And I do not think they would be able to make that shift.

Senator LUJÁN. I appreciate that. Dr. Johnson.

Dr. JOHNSON. Yes. I would say, if anything, you know, you have a neighboring state, Arizona, that does very well on Standard Time and has shown that the golf industry can thrive. If anything, a lot of people say, and one of the reasons Arizona says they stayed on Standard Time, is because it gets too hot later. So a lot of people do like to do exercise later, and that often is actually a better time for our health to get our exercise in. So if we can get people up so that they can be more active in the morning and get this exercise and enjoy all the wonderful things like hiking, which I know, when I have gone to places like New Mexico, I do in the morning you know, I think that we can still have all these activities on either time, but I think Standard Time is the healthier choice.

Senator LUJÁN. Dr. Harkey.

Dr. HARKEY. So our work was looking at fatality data nationally rather than by individual states, in part due to sample size. But if the patterns hold in New Mexico, just like they have in our research across the country, then we are going to see an offset between the number of motor vehicle occupant deaths that have risen slightly during the time change periods, and pedestrian and bicyclist deaths that have decreased slightly during that same time period.

And so the net effect is one of really no change when we look at road safety data alone. And so if you are trying to make this decision on the basis of just road safety, I do not think the results of our study are going to point you in one direction or the other.

Senator LUJÁN. As a follow up to that, Dr. Harkey, Dr. Johnson pointed to a study from a professor at Eastern New Mexico University, Jeff Gentry, who showed 20 percent higher car crashes in locations where sunrises and sunsets are later. Now, I understand your point that darkness is a key measure of accidents, but this data shows me that sleep effects are powerful indicators as well. How do you view the risk of sleep deprivation on accidents versus risks from darkness?

Dr. HARKEY. So our study did not look specifically at that particular issue. I know other studies have, methodologies differ. Most of the studies that have tried to look strictly at that small amount of time change before and after in the crashes concur that the real issue here is the amount of ambient light and the time of day when it occurs. That darkness is the real key, and you just need to make sure that you are providing good safety interventions to address issues of darkness.

So whether that is improving technologies in the vehicles such as headlights, automatic emergency braking, or whether you are put-

ting in infrastructure measures that add more lighting, add more space for pedestrians and bicyclists to keep them separated from motorists, whatever you can do to reduce those conflicts in the darkness and improve awareness of other road users in the darkness, will be beneficial——

Senator LUJÁN. Appreciate that.

Dr. HARKEY.—regardless of the time change.

Senator LUJÁN. It sounds like you support my legislation to require technology be installed in vehicles to prevent impaired crashes, so I will take that as well. We will share that with my colleagues.

Mr. Chairman, I have one more question for Mr. Yates on Standard Time versus Daylight Savings. I will submit it into the record.

And just a note to the panelists, the reason I am asking so much about sleep is, as my colleagues know, I suffered a stroke 3 years ago. I have learned a lot about the importance of sleep. I definitely lived my life burning the candle at both ends, and now I do my due diligence to embrace sleep hygiene and all the rest. And so that is bearing a lot into this conversation that I am having with my constituents and others.

Mr. Chairman, I very much appreciate this hearing, though. Thank you all for being here.

The CHAIRMAN. Thank you, Senator Young.

STATEMENT OF HON. TODD YOUNG, U.S. SENATOR FROM INDIANA

Senator YOUNG. Well, I thank all of you for being here. I am the senior senator from the state of Indiana, and we have quite a history with Daylight Savings Time. For those of you who have consumed old "Parks and Rec" episodes, you may have seen the one that focused on this particular topic.

But let me walk through some of the things that have transpired in our state, and I will weave in there some of the unique perspectives that Hoosiers have brought to this. Until 2006, our state was chronologically divided, you might say, with some counties observing Daylight Savings Time and others not. And then in 2006, after years of debate, furious debate, our state decided to become the 48th state to adopt Daylight Savings Time.

In central Indiana, on the shortest day of the year, December 21, the sun currently rises at 8:02 a.m. and sets at 5:23 p.m. Under permanent Daylight Savings Time, sunrise would be delayed until 9:02 a.m., meaning Hoosiers would begin their day in darkness for much of the winter.

What works for East Coast states, I am hearing from many of my constituents, might not work for states like Indiana. We have 12 counties in the western part of the state that are in the Central Time Zone. So Evansville, Indiana, if you are familiar with that, you have got up near Chicago what we call "the Region" affectionately, and there are 80 other counties that are in the Eastern Time Zone.

So you know, this sort of suggests that maybe a one-size-fits-all national policy on time changes does not take into account the regional differences that significantly impact daily life. I understand we have a charge, Article I, Section 8, to facilitate interstate com-

merce. It was one of the major arguments of facilitating interstate commerce from the state level when we had this debate. So I anticipate we have heard that. I anticipate I will hear more of that from my colleagues, but that has to be balanced against other considerations, of course.

Leaving this decision to the states might allow local leaders, who best understand their communities, to weigh the specific needs of their residents, states along this line of argument, are in a better position to evaluate how changes in daylight hours affect school schedules, commuting patterns, public safety, and economic activity.

So I guess to the panel, do you believe that states like Indiana, with their unique cultures, and geographical challenges, and even histories as it relates to this issue, should have the flexibility to make their own decision, or do you think this decision should be standardized across the country?

We will begin with Mr. Yates, and I will give everyone an opportunity to speak to that, if you like. Yes, sir.

Mr. YATES. Thank you, Senator Young, for the question. And I mentioned Indiana in my opening statement because it is a perfect example of why the Commerce Committee needs to approach this carefully. Because to impose onto Indiana a solution that is the same as for New York and for New England is not in the best interest of the people of Indiana and is a little bit rude.

The one thing that I might say, though, is that I have never been to Indiana to testify, but I did go to Michigan to testify about their Daylight Saving Time bill. And I went to Nebraska and to Kansas, which are states like Indiana on the western edge of their time zones and would make the most sense for them to be in Standard Time.

And I advocated for that with the state senators and state representatives in those states. And all of them told me that all of their constituents do not care. They would rather, like they are in the middle of the winter, they are already going to school and, right, going to work in the dark, and they would just like to have a little bit of time after school and after work to be in the light. So I said, OK, this is your state.

Senator YOUNG. All right.

Mr. YATES. You get to pick.

Senator YOUNG. Thank you. Thank you for your response.

Mr. Karen.

Mr. KAREN. Well, I am no constitutional scholar, for sure, but I do not see in the Constitution where it says that the Federal Government regulates time. I do not know if time falls under Commerce. So it would naturally fall to the states if the Federal Government is not empowered to do so.

The CHAIRMAN. We have the view that everything falls under Commerce.

[Laughter.]

Mr. KAREN. I appreciate that. I will say, you know, I feel it is less of a state issue than it feels like a personal issue. And the ability to do, for example, to Senator Luján's comments, I can simulate or practice sleep hygiene whether the sun is up or down. But I can-

not simulate sun hygiene. I cannot light the world when we want to be out there when it is dark, right.

And so I think, to me it comes down to which choice, if you were to land on one, is going to be harder to adjust to. We are already on Daylight Saving Time for 8 months, so we would have to adjust for 4 months. If you reverse it, then we are adjusting 8 months of our calendar.

Senator YOUNG. Thank you, sir. Dr. Johnson, would you like to say something about this?

Dr. JOHNSON. Yes. I want to talk about the western edge of time zones. States like yours are more aligned with Central Time Zones. So already on Standard Time, your sun is going to be overhead closer to 1. When we go to Daylight Savings Time, now it is closer to 2. And we see that this really impacts health risks, mental health risks, safety risks, how kids do in school.

I want to highlight one Indiana study. When you guys ended going to the parts of the state that were on Standard Time——

Senator YOUNG. Wait, you are coming with a study? You are citing a study? Are we allowed to do that in this—is that consistent with the rules, Chairman Cruz? I am kidding, of course.

Dr. JOHNSON. So when part of Indiana ended Standard Time and went to seasonal Daylight Savings Time, they found that kids' high school test scores were actually much better when they were on Standard Time and dropped when they switched to even seasonal Daylight Savings Time. And that is not adding the exponential harms of bringing those 9 a.m. sunrises, like you said.

So we would love every place to be more in line with the sun. And as you said, states have different needs, you know, needs to get closer to that idea.

Senator YOUNG. Thank you, Doctor.

Dr. Harkey.

Dr. HARKEY. So we did not have a preference in our study for one time or the other in terms of how you set it. What our study showed was that the risk of fatalities for pedestrians and bicyclists in particular rises at night, and it rises for all motorists as well at night.

So the real key is, regardless of which decision you make and which time zone you use, you have got to make sure that you are putting interventions in that is going to help with those who are traveling in those dark hours, whether it is more in the morning or more in the afternoon and evening, that is the real key, and particularly for pedestrians and bicyclists, who are the overwhelming number of fatalities that are occurring in those dark hours.

Senator YOUNG. I see. I am very much over time.

I see that Mr. Karen has something he wants to say, so I have been given leave by the Chairman. Please, go ahead.

Mr. KAREN. I just want to point out that Senator Scott's bill, the Sunshine Protection Act, kind of threads the needle. It creates a Federal Daylight Saving Time but allows every state to opt out if they choose. So I think that is maybe the best answer here.

Senator YOUNG. Good point. All right.

Thank you, Chairman.

The CHAIRMAN. Thank you, Senator Markey.

STATEMENT OF HON. EDWARD MARKEY,
U.S. SENATOR FROM MASSACHUSETTS

Senator MARKEY. Yes. Thank you, Mr. Chairman, very much. So it is 1985. It is my fifth term in the U.S. House of Representatives, and I become the Chairman of the Energy Subcommittee on the Energy and Commerce Committee. And searching through the jurisdiction of this wonderful subcommittee is, time. I guess somebody is going to have to be Chairman over time. And it is me. I am Chairman of time.

And nothing had been driving me crazier than the birds chirping, you know, at 5 a.m. in the morning. It is sunshine out. It is the end of April. This is not good. So I began a negotiation with Bill Goodling, who is a Republican from Pennsylvania, to move time. And it was a hard, grudging discussion, but I was able to move it from the end of April to the beginning of April in 1986. And so that changed it, because at that point it was 6 months daylight, 6 months standard.

So I was able to claw back three weeks, pretty much to right now. Otherwise, we would still be another two or 3 weeks where there is no Daylight Savings Time. Then Congressman Goodling left, and so in 2005 I am still on the Energy Subcommittee. So with Fred Upton, who is a Republican from Michigan, we cut another deal, and we moved it to the beginning of March. And we also said, let us put Halloween in Daylight Savings Time, and so we moved it into the beginning of November.

So at that point, I am at 8 Daylight, 4 Standard. OK. So I am kind of proud of my two bills Changing Time. You know, they started to call me the Sun King, which I was kind of proud of, because those are big bills, Mr. Chairman, that is moving time, and the whole world then starts to move to that standard.

So we had to stop there. And then two years ago, Senator Rubio and I, we had a bill to do Daylight Savings Time year-round, and it passed by unanimous consent out on the floor of the Senate. It was then stalled in the House, never had a vote over there. But I consider this kind of an inexorable march toward more sunshine that people can enjoy, not while they are asleep, you know, having the sun come in early in the morning.

So that is my goal. My goal is just to make sure people get more sunshine in the evening, when they can use it, especially, as I heard your opening statement, Mr. Chairman, as our economy has changed, and we are not an agricultural-predominant economy any longer, although farmers play a vital role in our society, but we are more into the economy that we all live in today.

So I guess my first question, Mr. Karen, is how would extending evening daylight support small businesses in your industry?

Mr. KAREN. It would add to the golf industry at least $1 billion of economic activity. The average golf course would see an increase in approximately $250,000 in revenue. And I mean, that is an economic argument. But the golfers around America, the 30 million golfers would get to enjoy all of that. So that is the argument.

Senator MARKEY. Right. But it is also true that, let us just go back to 1986, it is hard to start your Little League practices if it is still dark in the evening at the end of April. The kids are still not going to be allowed out into the dark, or you are playing tennis

or walking around. So that change was very important to us in 1986.

Mr. KAREN. Yes. Yes.

Senator MARKEY. And then again in 2009?

Mr. KAREN. My brother happens to be an athletic director at a high school, and he said: We do not like having to spend money on lights for every single activity that happens after school.

Senator MARKEY. Yes. So would an additional hour of evening sunlight help businesses save money on energy costs from not having to turn the lights on early, much less athletic?

Mr. KAREN. Well golf, we do not light the golf courses, so it would not be an energy savings for us. It is mostly about health and economic.

Senator MARKEY. Health and economic, yes.

And Mr. Yates, what does your research say about the benefits of ending the switch twice a year between Daylight Savings Time and Standard Time?

Mr. YATES. Thank you, Senator, for the question. And I appreciate the nickname that you got. It is better than the nickname that the Comedy Central, the "Daily Show" called me the Time Wizard, and so I was—I was not sure if I should be offended or not

Senator MARKEY. I am going to keep Sun King for myself. OK.

Mr. YATES. Sun King is way better than Time Wizard, right.

Senator MARKEY. Yes. And I like that title.

Mr. YATES. Yes.

Senator MARKEY. Yes.

Mr. YATES. The detrimental effects of switching the clocks are super clear, and it seems like we have got pretty much unanimous agreement about that at this point. And what is delightful about it from my perspective is to hear you tell these stories, because you clearly have been a pioneer on this for a long time. And what is great is that this has never been at all a partisan issue. It has always been a completely bipartisan issue, when you look at the 24 states that have enacted something to it.

Senator MARKEY. Can I say this as well? And opposition, it has always been bipartisan.

Mr. YATES. Yes.

Senator MARKEY. Because I had to negotiate with Representative Goodling, who is a Republican, you know, on the other side. But I had Republican, Carlos Morehead from Orange County was on my side, a Republican, and I had to negotiate with Larry Craig, who was the Senator from Idaho. He was the Senator before Jim Risch. So I had to negotiate with him on this. He was in opposition. But I had Fred Upton from Michigan, who was a supporter.

So it has always been bipartisan on either side, you know, these coalitions that are there. And so that is the only way, from my perspective, that we are going to be able to work here as well in order to make some progress. And you know, it is—we just have to make Daylight Saving Time permanent, in my opinion, one way or the other, or at least get more, we need more sunshine, you know.

And the reason, Mr. Chairman, it is from my perspective, it just—when the sun is out, it just increases the likelihood that the corners of people's mouths are going to be turned upwards. They are going to be happier when the sun is out. They are going to be

feeling good. It is why so many people move to Texas, by the way, and not Florida.

[Laughter.]

Senator MARKEY. It is not the politics; it is the sun they are chasing, right. So this is, from my perspective, a universal feeling, right, that when that sun is out and they can go out and enjoy it in the evening, it just makes all the difference in the world to them, and so we have to find a way here of resolving these issues to be able to deal with it.

And I know there are disagreements on it, including, I know Karin Johnson is here from Massachusetts, and she is on the other side of the issue, which I respect. So it is just a big conversation that I hope we can resolve, because I just think it is for the benefit of people's happiness just to have that sunshine available. They can do a lot more in the sunshine in the evening than they can do early in the morning.

And I thank you, Mr. Chairman, for the opportunity here.

The CHAIRMAN. Thank you, Your Majesty.

[Laughter.]

The CHAIRMAN. And I will say, I did not know that my friend from Massachusetts had acquired the nickname the "Sun King," which, the previous Sun King, of course, was King Louis XIV in France, whose best-known statement was "L'état, c'est moi" I am the state, which may explain the differences between Senator Markey and myself on the size of government.

Senator MARKEY. Well, I think President Trump is quoting King Louis very favorably.

The CHAIRMAN. That is a fair point, since he did, in fact, tweet out "L'état, c'est moi."

Senator MARKEY. I think I did—I saw, I did not know he knew French, but I think he, in fact did—in fact, quote favorably not even—as you are. You are doing it with a very high risible coefficient, I mean, you are doing it jokingly. I think he was serious.

The CHAIRMAN. Well——

Senator MARKEY. Although, I will say this: I think you gave the President good advice two days ago acting. We will call it more like King Louis then.

The CHAIRMAN. Well, I will note, as you know, I lived three years in Massachusetts, and I remember my third year of law school, where it snowed in the month of May, which I thought was positively immoral. And as you noted, the sun is a very good recruiter for the Great State of Texas. I am fond of saying, you cannot shovel sunshine, and that is a gift.

Senator MARKEY. And I will give you some news that the winters in Boston are now 6 degrees warmer than they were in 1970 because of climate change. So our ponds do not even freeze over in the winter anymore, much less snowing in May. So maybe kids from Texas going to law school up in Boston now enjoy May a lot more than they used to.

The CHAIRMAN. All right. So I am going to ask a couple more questions, then we are going to wrap up the hearing.

Mr. Karen, give us your best argument why recreational daylight is so important to your members?

Mr. KAREN. My members deliver joy for a living, and they happen to run businesses making that happen. So to them, if they saw more people in the afternoons and the evenings enjoying the outdoors with each other, it is why they get out of bed. It is why they do this. So they will have better lives as business owners. They will be able to pay the bills a little bit better and reinvest in their businesses if they had a little bit of a boost more in the afternoons and evenings.

The CHAIRMAN. That was helpful. Although I will say, on the delivering joy, I could not help but think of, I think, the best comedy riff ever done, which is Robin Williams' on golf.

Senator MARKEY. I have seen it.

The CHAIRMAN. Which I will note is profane but screamingly funny. And he points out that golf was invented by the Scots and how infuriating it can be at times. And he said: "I know, we will call it a stroke, because when you miss, you want to have a stroke."

[Laughter.]

Mr. KAREN. Very good.

The CHAIRMAN. All right, Dr. Johnson.

[Laughter.]

The CHAIRMAN. Would shifting time zones slightly address the concerns for communities that are in dark zone areas if the clock were permanently set on Daylight Saving Time, does shifting the time zones make a difference?

Dr. JOHNSON. So we would encourage all states to be within their sort of time zone that is closest to the sun being overhead at noon. So, for example, like Indiana being more in the Central Time Zone versus the Eastern Time Zone would help get them more aligned with the sun. But it should be Standard Time. So there has been a push on the East Coast to have us in Atlantic Standard Time. That is the time set for Bermuda. That is not the time set for any of the East Coast.

So you know, we want permanent standard Eastern Time, not permanent standard Atlantic Time, which is the exact same as permanent Daylight Saving Time.

The CHAIRMAN. Dr. Harkey, what has your research found as it relates to traffic accidents immediately following a time change?

Dr. HARKEY. So that is what we were looking at as part of our research, was in that 5-week period before and the 5-week period after the time change. And when we fall back in the fall, vehicle occupant deaths go down about 7 percent. And when they spring forward, vehicle occupants' deaths go up about 12 percent, and the exact opposite with pedestrian fatalities.

So when we fall back pedestrian fatalities rise 13 percent, and then when we spring forward, they go down 24 percent. And so the net effect is almost zero between pedestrian and vehicle—pedestrian, bicyclists, and vehicle deaths. And so that is why our research really does not come out strongly in favor of either one.

But what is clear is that darkness matters. And that is where we do about a quarter of our travel at night, and yet that is when 50 percent of the vehicle occupant deaths occur, and when more than three-quarters of the pedestrian deaths occur. So regardless of what policy decision is made with regards to the time and where we set the clocks, we have to make sure we are continuing to im-

prove our infrastructure, continuing to improve vehicle technology that will address the safety risk that we have at night in dark conditions.

The CHAIRMAN. So you just said darkness mattered, and it occurred to me, an alternative title for this hearing, instead of "If We Could Turn Back Time," might have been "Hello Darkness, My Old Friend."

All right. Look, this hearing was important, and I wanted to hear all this testimony, because I personally struggle with the two choices here. Because it is a question of: what do you care about more sunshine, and joy, and fun, and money, or health, mental health, physical health? And the honest answer for most people is, "Gosh, I care about all that stuff. So that is not an easy tradeoff.

The alternative that has been suggested is, let each state make that decision. And I guess it has been pointed out that Senator Scott's Bill does a version of that by picking Daylight Saving Time but then letting states opt out.

Let me ask a practical matter: Does that work? Functionally, how confusing is that, having everyone pick different times, how does that work for commerce, for life, for knowing what the hell time it is? Let me have each of you answer that.

Mr. YATES. Senator Cruz, thank you for that. The one little part of Senator Markey's history about when they changed the time in November was that the proposal was to move Daylight Saving Time to finish at the end of November. And the airlines came back and said: No, no, no, no. We do not want a time change in the middle of our busiest travel season. And so they were going to scrap that, and then they got the extra week to put it in.

So time is always complicated. And the system that we have, the system that we—excuse me—the system that we have is complicated, but it is complicated because it is a human creation, right. The sun moving around the Earth does not actually have anything to do with time. Time is the agreement that we have about what 10 o'clock means, because we do not want to go around saying, you know, the Committee hearing will start when the sun is two hands above the horizon.

We need this system. But the system has this bug right now, and the bug is Daylight Saving Time. It is the switching of the clocks. And so if we have a little bit of time, a couple of years, so that the individual states can address all of these complexities and make those decisions, then we will be able to get rid of this bug permanently. It is something that we have been stuck with since World War I, and this is our opportunity to finally fix it.

The CHAIRMAN. Mr. Karen.

Mr. KAREN. You know, I am not going to say that government solutions cause more confusion, but you can imagine in this scenario that Florida is on Daylight Saving Time, Georgia right above it on Standard, South Carolina is on daylight, et cetera, in the same spot, because maybe special interests of all kinds made that happen.

So I already have problems remembering which state is in which time zone as it is right now, sometimes the Border States, and add to that: Oh, they are in Central and they are on Standard. Oh, what time is it there exactly? So I can see where this causes more

confusion. I wish I had a better answer for you on that one, but could we adjust and figure that out quickly? I do not know. I see it as problematic, but it may be the only way to thread the needle.

The CHAIRMAN. Dr. Johnson.

Dr. JOHNSON. Yes, I think, you know, the economy, the transportation industry, certainly needs consistency and alignment. So we want to make this change once. We do not want to pick something that is tried and then failed twice before, such that we spend lots of money fixing it again in a few years. You mentioned the economy, which again, you know, is so important, and you know, the majority of our workers start work early. The average work start time is 7:55 in the morning. So we would be forcing people all winter to go to work in the dark, really affecting their productivity and economics.

And so while certain businesses are going to have different benefits of the sun, I actually do want to give sun to people when they use it, when they use it to get up, when they use it to be healthy, when they use it to be more productive and efficient at work and to improve the overall economy, not just niche businesses like the golf industry that have shown they can be very successful in Standard Time, like in Arizona.

The CHAIRMAN. Dr. Harkey.

Dr. HARKEY. Strictly speaking from a road safety perspective, I am not sure it would make any difference if states had the right to select the time, because it is, again, about the amount of light, the amount of ambient light during the times of travel. And so I do not think it would have an impact, personally. It would probably confuse me. But that is if we had that problem.

I will give you a quick anecdote. Almost 40 years ago, we were collecting speed data in New Mexico and Arizona as part of a research study. Had no idea at that time, being right out of school, had not really paid attention that Arizona did not bother to go to Daylight Saving Time, so that all of our equipment was an hour off when we went to pick up all the speed data, and we had to adjust it after the fact.

And so I think you would have those kinds of things, right, that could work their way into the system, unintentional mistakes, if we were to get into a system where we had a lot of different time zones going on.

The CHAIRMAN. Well, I, for one, am thankful for these magic devices that we carry, that when I land on a plane, I look down to figure out what time it is, because I am on a lot of planes and it changes.

I want to thank each of the four of you. This has been very helpful testimony, and you all have different perspectives, so each of you has added significantly to it.

Senators will have until the close of business on Thursday, April 17, to submit questions for the record. The witnesses will have until the end of the day on Thursday, May 1, to respond to those questions.

And this concludes today's hearing. The Committee stands adjourned.

[Whereupon, at 11:29 a.m., the hearing was adjourned.]

A P P E N D I X

Response to Written Question Submitted by Hon. Ted Cruz to Scott Yates

Question. Current law allows states to opt out of daylight saving time (DST) without an act of Congress. In fact, both Arizona and Hawaii have done so. How do you explain why only two out of 50 states have decided to opt out of DST?

Answer. There are several reasons why most states have not opted out of DST:

1. *Public preference:* More daylight in the evening is generally popular, and legislatures tend to reflect the will of the people.
2. *Business alignment:* Many industries prefer later daylight hours, and states often seek to stay in sync with national economic patterns.
3. *Regional coordination:* States worry that being out of step with neighbors could cause confusion and disruption for businesses and travelers.

Additional context:

- Not all of Arizona has opted out of DST. Navajo Nation lands, which span multiple states and are larger than 10 U.S. states by area, still observe the time changes.
- After the Uniform Time Act of 1966, four states initially chose to stay on Standard Time year-round: Hawaii, Arizona, Michigan, and Indiana. Michigan and Indiana later reversed course, opting to rejoin the spring and fall time changes rather than remain in Standard Time year-round.

Regulating time zones is more complicated than it might seem. Today, several states (such as Indiana, Tennessee, and Nebraska) already have internal divisions. Rather than creating new confusion, the Sunshine Protection Act would actually reduce complexity by locking the Nation into a consistent time system, improving predictability for commerce. It would also give those states that are split the opportunity to re-unite into one time zone.

Finally, it is important to note that in 1966, Congress did not have the benefit of decades of medical research now available. Studies today overwhelmingly show that the biannual clock changes are harmful to public health and safety—a fact that strengthens the case for Federal action by passing the Sunshine Protection Act while allowing states to have the rights, and the time, to choose which time zone they want to lock into.

Response to Written Questions Submitted by Hon. Maria Cantwell to Scott Yates

Public Opinion on Daylight Saving Time: Sunrises and sunsets occur at significantly different times within the same time zone. For instance, on the darkest day of the year, the sun rose in Seattle at 7:55 AM, but in San Diego, California, it rose at 6:47 AM, over an hour earlier. The differences can be even more pronounced in the Central Time Zone, where in Williston, North Dakota, the sun rises at 8:42 AM while it rises nearly two hours earlier in Mobile, Alabama.

Question 1. How does a state's location within a time zone impact people's opinions on Daylight Saving Time?

Answer. A state's location within a time zone likely affects public opinion on Daylight Saving Time—but no polling has directly measured it.

- Most public opinion research on DST is conducted at the national or state level.
- There is little to no polling that focuses on east-west variations within time zones.

- Sunrise and sunset times can differ by more than an hour within a single time zone, as your examples show, and those differences likely shape people's views—but the data simply doesn't exist yet.

This geographic complexity is why I recommend a *two-year implementation period* for the Sunshine Protection Act.

- A two-year window would give states, communities, businesses, and school districts time to experience both winter and summer under permanent Daylight Saving Time.
- Local policymakers could adjust school hours, work schedules, or advocate for a time zone shift based on real-world experience.
- Congress would ensure a consistent national policy while allowing flexibility for local adaptation—balancing Federal leadership with local realities.

Question 2. Has there ever been a nationwide poll of public opinion on "locking the clocks"? What do available polling data tell us about people's opinions on whether we should switch to permanent standard time, permanent Daylight Saving Time, or keep the seasonal switch?

Answer. There have been many polls about "locking the clocks," but the quality varies depending on how the questions were asked.

- Many polls ask vague questions like "Do you favor DST?" without clarifying whether that means permanent DST, permanent Standard Time, or keeping the seasonal clock changes.
- The *clearest national poll* in recent years asked voters directly about the Sunshine Protection Act:
  - Strongly support: 45 percent
  - Somewhat support: 23 percent
  - Somewhat oppose: 7 percent
  - Strongly oppose: 7 percent
  - Don't know/No opinion: 18 percent

State legislative action also reflects strong support for locking the clocks into permanent Daylight Saving Time:

- Since 1966, two states (Indiana and Michigan) initially opted for permanent Standard Time but later switched to seasonal DST.
- Only two states (Hawaii and most of Arizona) have remained on permanent Standard Time.
- 24 states have passed legislation to adopt permanent DST if authorized by Congress, with many others considering similar measures.

Public opinion on keeping the seasonal clock change is relatively small—and outweighed by clear evidence of public harm:

- Polls suggest about 10 percent of people favor continuing the clock changes.
- However, as with other public safety issues—for example, the Federal ban on metal-tipped lawn darts after they caused three fatalities—action is justified when lives are at stake.
- The biannual clock change is linked to:
  - At least *20 additional traffic deaths* each year.
  - Significant increases in heart attacks, strokes, and other medical emergencies, contributing to *hundreds or even thousands* of premature deaths annually.

The best way forward is to act now to end the clock-changing, while allowing states flexibility to adjust.

- A two-year implementation period would allow states, businesses, and schools to experience both winter and summer under both simulated time structures.
- States would have the ability to adapt: adjusting school start times, business hours, petitioning for a time zone change if appropriate, or even holding an election to let voters decide directly.
- This approach fixes the critical public safety problem immediately while respecting local preferences for how best to align daily schedules.

If Congress could act decisively to ban lawn darts after three deaths, surely it can act now to end a practice that costs hundreds of lives each year.

RESPONSE TO WRITTEN QUESTION SUBMITTED BY HON. BEN RAY LUJÁN TO SCOTT YATES

Question 1. If your goal is to end clock changes and the health data supports permanent standard time, why not move everyone to standard time and allow Daylight Standard Time if states want, rather than the other way around?

Answer. I would certainly support this.

The problem is that while I am the founder of the wildly popular #LockTheClock movement, the reality is that I am just a lone citizen who blogs and testifies about this issue as a hobby.

In other words, my support is not nearly enough.

What we need is the support of health experts and business leaders. Advocating for permanent Standard Time as the default position will garner opposition from wide swaths of business groups, including recreation, retail, outdoor activities, etc. That will, in turn, lead to opposition from health groups because advocating for Standard Time, in reality, is advocating for keeping the status quo, which includes the deadly clock changing.

As Sen. Luján knows all too well, we should do everything we can to reduce the incidence of strokes in the U.S. While changes to diet, exercise, medication and more are important, they are also lifestyle changes that are difficult to legislate.

The clock-changing, however, can be fixed and research published in the medical journal Circulation (V. 118, N. 3) is clear that the clock changing causes a significant spike in the number of strokes that require hospitalization.

Interestingly, most other negative health outcomes associated with clock changing apply only in the spring change. Heart attacks, for instance, go up after alarm clocks jolt people awake an hour earlier than their bodies expect. Traffic accidents spike. Hospital errors jump. In the fall when people get an extra hour of sleep, there is no spike in heart attacks and we don't see the other negative health impacts.

But strokes requiring hospitalization go up after the spring forward change, *and* also after the fall-back change. Clock changing in general causes more strokes.

So from a health perspective, the most important thing to do is to take action to Lock the Clock, and the most effective way to do that is to enact the Sunshine Protection Act, and do so with a *two-year implementation* so that individual states can have the science-based discussion about which time is most appropriate for that state given its physical location.

As someone who understands firsthand the impact of stroke, your leadership on this issue could help save countless lives across America.

RESPONSE TO WRITTEN QUESTION SUBMITTED BY HON. LISA BLUNT ROCHESTER TO SCOTT YATES

Question. How does a state's location within a time zone impact their opinions on Daylight Saving Time?

Answer. I haven't seen any polling specifically on this issue.

The question, however, gets to a crucial part of what must be considered by the U.S. Senate when looking at a national policy. Typically a national policy applies to all citizens equally, but this one is quite different.

Part of the reason there isn't polling is that typically pollsters ask questions of a national or perhaps a state sample group. There are no commonly used geographic areas that would make it possible to even conduct such polling.

That is why my suggestion to Congress is to modify the Sunshine Protection Act to have a *two-year implementation phase.*

Right now this debate is theoretical, and because it's been debated for so long, local policy makers and indeed the public have not taken action because they haven't had any reason to think that a healthy change is coming to the way we change the clocks twice per year.

If Congress were to enact the Sunshine Protection Act—and have it implemented after the "spring forward" change in March two years after enactment—then every state legislature, every school board, every business would have the opportunity to live through a winter and a summer estimating where the sun is in relation to the clock. State legislatures, if they like, could even have statewide elections to determine if a state will lock the clock in permanent Daylight Time or Standard Time.

In that way, the U.S. Congress would be properly fulfilling its role in regulating interstate commerce and the regulation of time zones, but local communities would be able to adopt either the appropriate time for their state, or adjust their schedules in ways that reflect their local realities.

RESPONSE TO WRITTEN QUESTION SUBMITTED BY HON. MARIA CANTWELL TO
JAY KAREN

Question. On the question of what the impact would be if adjoining states were to elect to have different daylight time designations. I am pleased to offer a brief reply.

Answer. The issue of what "clock" a state may be on in the future would be a consideration when people make plans to spend a morning, afternoon, day or road trip to play golf. If golfers, especially living near state borders where time changes (such as time zones and Daylight or Standard time) could impact plans, do not pay close attention or miscalculate the sunrise and sun setting times, they could experience frustration.

With adjoining states having different "clocks," tee time booking systems and tour operator systems will have to be specifically programmed to ensure daylight considerations are clear and understood at the time of booking. It's easy to see people making this mistake: a 2:00 pm tee time in one state allows them to finish before dark, whereas a 2:00 pm tee time in a neighboring state (on the same golf road trip) might be curtailed by darkness.

To be honest, it's hard to even imagine the cascading effect of having states on different time zones *and* different "clocks" for the sun. While it's easy to posit this issue as a "states' rights" one, it's not hard to see how confusion may be sowed by it. I'm sure modern technology in our smartphones will help us get acclimated to such changes, but it will be interesting to see (if it happens).

In the golf industry, we simply know that later-afternoon sunlight is an important driver for increased play, which leads to better health and a better economy. NGCOA would be amenable to all states recognizing Daylight Saving Time year-round, but as we see in Texas and New Mexico, whose communities border Arizona, golfers can adapt to the different daylight periods.

RESPONSE TO WRITTEN QUESTION SUBMITTED BY HON. TED CRUZ TO
DR. KARIN JOHNSON

Question. Current law allows states to opt out of daylight saving time (DST) without an act of Congress. In fact, both Arizona and Hawaii have done so. How do you explain why only two out of 50 states have decided to opt out of DST?

Answer. There is strong economic, communication (radio/cell phone), and transportation interest for states to remain in alignment with neighboring states and/or to be in alignment with certain states, such as a desire to align with Wall Street. Because any state can establish permanent Standard Time, there has been more hesitation to pass laws for standard time on a state level often wanting to defer to the Federal government to mandate a coordinated change so as not to cause major misalignment between states.

Additionally for many years there has been a large degree of misinformation spread stating that permanent daylight saving time would lead to improvements in health, mood and safety despite the data to the contrary. Cited data relies on the presumption that the only harms of daylight saving time are the twice yearly switches and disregards any harm from permanent daylight saving time itself. Rather the long-term effects of living on Daylight Saving Time increases the risk of chronic diseases and worsens safety and productivity to a greater degree than the short-term harms after the switching of clocks in the spring and fall.

Over the last 4 years, however, especially since the medical and scientific position statements supporting permanent standard time and increasing recognition of the problems with permanent daylight saving time, there has been growing political and public interest in adopting permanent standard time. This year there are more states with bills asking for permanent standard time than for permanent daylight saving time. On the other hand, over the last several years, there has been a rapid decline in the number of states passing bills requesting permanent daylight saving time. This aligns with what is being seen with an increasing number of national polls favoring permanent standard time. The most recent National gallop survey was strongly in favor of permanent standard time (48 percent) compared to permanent daylight saving time (24 percent).

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. MARIA CANTWELL TO DR. KARIN JOHNSON

Health Impacts of Daylight Saving Time: In your testimony, you cite several studies that have found that Daylight Saving Time is associated with worse sleep quality because later sunrises disrupt our natural circadian rhythm.

Question 1. How are the health impacts of switching to Daylight Saving Time different from jet lag caused by traveling between time zones?

Answer. When we travel from one time zone to another, the new timing of sunrise and sunset in our new location resets our circadian rhythms to that new time zone. This natural reset of our internal clocks typically occurs at the rate of 1 to 1.5 days per 1 hour of time zone change (that is, we typically realign to our new environment within a day for shorter distances and within a week for longer trips).

Until our bodies adjust to the new local sun time, we experience a short-term circadian misalignment known as jet lag, the signs of which include fatigue, sleepiness, sleep disturbances, difficulty concentrating, digestive issues (such as upset stomach, diarrhea, and constipation), irritability, mood disturbances, headaches, and dizziness.

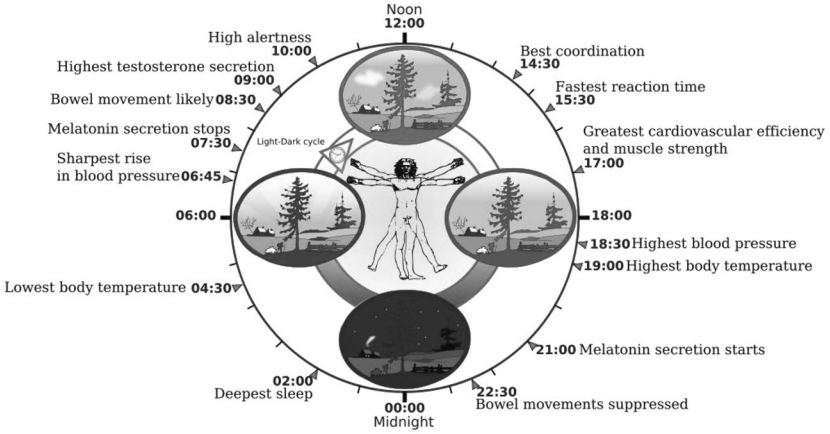
If you are a very frequent traveler, then the constant disruption to circadian rhythms can be similar to the risks of shift-work disorder. These include increased rates of cancer, heart disease, high blood pressure, obesity, diabetes, irritable bowel syndrome, depression, and other metabolic and mood disorders. These are also similar to what is seen with the effect of setting clock time later under Daylight Saving Time.

When we change clocks to Daylight Saving Time, we do not change our environmental light timing. Our circadian rhythms and bodily hormones remain more aligned to the sun's time, and this creates a long-term misalignment between our internal rhythms that are set by the sun and our social schedules that are set by the clock. This misalignment persists throughout the entire Daylight Saving Time period. Factors that increase the negative impacts of Daylight Saving Time include:

1. Living on the western end of a time zone, because this is where misalignment of clock time and sun time is largest.
2. Being a teenager or night owl, because their rhythms are naturally already delayed, compared to other population groups.
3. Having a start time before 8:30 AM, because their earlier work or school schedules necessitate earlier bedtimes to get sufficient sleep before their morning alarms sound, and these earlier bedtimes are often thwarted by the extended hours of evening daylight.
4. Observing Daylight Saving Time in winter, when unavoidably shorter periods of sunlight make for darker mornings, which deprives exposure to natural light at the time of day when our bodies and brains need it most.

When clock time is moved later by Daylight Saving Time, our body rhythms are less able to anticipate our daily actions. In the morning, the alarm rings before our body naturally wants to get up. In the evening, we are less able to fall asleep at the time you need to go to bed to get enough sleep at night. This may lead to chronic sleep loss. Even small amounts of sleep loss can significantly increase risks of many health problems, including stroke, heart disease, obesity, depression, and dementia.

Circadian disturbances alone can also negatively impact our health, even with adequate sleep. An example of this is social jet lag, such as when we force ourselves to wake much earlier on weekdays than when we naturally wake on weekends. This continual change in daily timing can cause digestive and metabolic hormones to be produced out of sync from when we are eating, which can lead to poorer processing of food, irritated bowel, obesity, and diabetes. Circadian disruptions increase wear and tear on our immunity and healing, which can increase risks of infections, cancer, and dementia. Alertness, sleep quality, cognition, mood, and performance are also strongly affected by circadian regularity or irregularity.



Question 2. In Washington state, the latest sunrises in the darkest parts of the year are near 8 AM, even on standard time. If the sun rise is already later than when most people are going to work or school, will a switch to Daylight Saving Time make a difference on sleep quality?

Answer. When waking too early (relative to sunrise) is a problem, the answer is not to wake even earlier (as Daylight Saving Time covertly makes us do).

Currently, Seattle has 0 days with sunrise later than 8 AM, and a latest winter sunrise of 7:58 AM, which would not change under permanent Standard Time. Permanent Daylight Saving Time would postpone Seattle's sunrise past 8 AM for 112 days (nearly 4 months), and it would delay its latest sunrise to 8:58 AM.

Seattle's longitude is 122 degrees west, and the meridian for Pacific Standard Time is 120 degrees west. This close alignment between sun time and clock time keeps sunlight balanced across morning and evening, for optimal circadian health. When work schedules cause us to miss natural sunlight exposure both before and after work, then other "zeitgebers" (time cues) have more influence on setting our rhythms, such as artificial light, or when we eat our meals. But these still tend to balance around noon.

Permanent Daylight Saving Time in Washington and elsewhere would delay winter sunrises until after most people go indoors to work and school for several months at a time. When morning sun light exposure is missed, evening sunlight exposure causes our circadian rhythms to delay.

This disruption of our circadian rhythms leads to serious health and performance issues.

While artificial light in the morning can help counteract circadian disorders such as depression and chronic fatigue, no artificial light can compare in brightness and quality to natural sunlight (even when filtered through clouds or precipitation). Furthermore, Daylight Saving Time's unseasonable exposure to evening daylight compounds the problems caused by lack of morning light. Unless individuals can expose themselves to high levels of artificial light (for example, 30 minutes of a 10,000-lux light box) each morning, as is prescribed for seasonal affective disorder and delayed sleep-phase syndrome, and they can purposely avoid artificial light in the evening (which they are more likely to be exposed to because they are more likely to stay up later during Daylight Saving Time), then their rhythms are likely to become delayed and chronically misaligned.

These negative effects were seen when Russia tried permanent Daylight Saving Time between 2011 and 2014, before their nation finally switched to permanent Standard Time. 16 percent more adolescents had over two hours of social jet lag during permanent Daylight Saving Time compared to permanent Standard Time. In other words, one hour of clock change led to over two hours of circadian misalignment in susceptible individuals.

Many studies show that having a clock time set one hour later than sun time can negatively affect both sleep duration and quality. The effect is greater for locations on the western ends of time zones, where circadian alignment is already delayed. Circadian rhythms most obviously affect sleep, but they also play very important roles in the timing of all bodily systems. Thus a delayed rhythm negatively effects

metabolism, digestion, immunity, healing, hormones, heart health, and brain function, to name a few.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. MARIA CANTWELL TO DR. DAVID HARKEY

Lighting Conditions and Roadway Safety: In the 1970s, the United States piloted year-round Daylight Saving Time. At the time, it was widely reported that mothers raised significant concerns about their children walking to school in the dark in the winter. They understood that visibility was a serious safety concern. Nationwide, over 70 percent of fatal accidents involving pedestrians occur at night.

Question 1. How do low light conditions impact roadway safety for drivers and pedestrians?

Answer. Low lighting levels at night reduce a driver's ability to detect and recognize pedestrians. It is estimated that the time between 6:00 p.m. and 7:00 a.m. accounts for around 22 percent of miles traveled,[1] but in 2023 55 percent of all traffic fatalities and 80 percent of pedestrian fatalities occurred in the dark or low light (including dawn/dusk).

Question 2. No matter what time the sun goes down, what roadway improvements can cities and states make to reduce pedestrian fatalities?

Answer. The clearest result from our daylight saving time study was that pedestrians and bicyclists are at greater risk in low-light and dark conditions, regardless of what time of day those conditions occur. Having sidewalks in urban and suburban areas or separated paths or paved shoulders in rural areas helps to ensure pedestrians are not walking in the vehicle travel lanes.[2,3] The addition of lighting along these corridors and at intersections also makes a difference.[4,5] At crossing locations, the use of rectangular rapid flashing beacons and pedestrian-triggered lighting can increase motorist yielding behavior.[6]

Question 3. What vehicle technologies can help protect pedestrians when it is difficult for drivers to see?

Answer. There are two vehicle technologies that are most important to help protect pedestrians. First, headlights—the original collision avoidance technology. We have been rating headlights for nearly a decade, and automakers have subsequently been improving their headlights. We have been able to show that vehicles with headlights with good ratings in our tests can reduce nighttime pedestrian crashes by 23 percent compared to vehicles with poor-rated headlights.[7] Second, automatic emergency braking with pedestrian detection. We have shown that early systems reduced pedestrian crash risk by 32 percent during the day but did not reduce pedestrian crashes in the dark.[8] However, automakers are now improving these systems to work better at night and score higher in IIHS's testing program.

Combatting Drowsy Driving: Sleep experts believe that Daylight Saving Time impacts people's sleep quality, which could lead to more people driving while they are tired. Driving while sleep-deprived has similar risks to driving while drunk. The

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AAA Foundation for Traffic Safety estimates there are over three hundred thousand crashes each year caused by drowsy driving.

Question 1. How can the vehicle safety requirements in the Bipartisan Infrastructure Law mitigate drowsy driving? Which technologies should USDOT be prioritizing?

Answer. There are several companies working on technologies to monitor drivers, assess their level of distraction or lack of engagement in the driving task, and potentially detect drowsy driving. There are other groups working on technologies to detect alcohol impairment prior to starting the vehicle and during the trip. All of these technologies need to be pursued, given our state of road safety. Remember, alcohol impairment, distraction, and drowsy driving contribute to more than a third of our fatalities. We need to invest in multiple technologies to find those that are most effective and feasible. We also need NHTSA to issue the rule to mandate advanced impaired driving technology as required of them under the Bipartisan Infrastructure Law.

Question 2. What can state and local governments do now to improve their infrastructure to address drowsy driving?

Answer. Drowsy driving often results in lane departure crashes, either off the right side of the road into a fixed object, into an adjacent same-direction lane sideswipe collision, or across a centerline in a head-on collision. The use of rumble strips both on the edge of the roadway and the centerline can be an effective way to alert drowsy drivers.[9] On approaches to intersections, the use of transverse rumble strips or stripes, advance warning flashers, and strobe lights in red signal faces can serve a similar purpose.[2,10-11]

Safe System Approach to Roadway Safety: Roadway fatality rates in the United States are 15 percent higher than they were a decade ago. In Washington state, 810 people died in traffic in 2023, a 10 percent increase from the year before and the largest number of traffic deaths in the state since 1990.

Currently, three Federal agencies, the Federal Highway Administration, the National Highway Traffic Safety Administration, and the Federal Motor Carrier Safety Administration, work with State Departments of Transportation, state law enforcement agencies, and state safety agencies to improve highway safety. Often, these agencies are siloed and lack meaningful communication and coordination.

We have learned from other industries, including the aviation industry, that safety is the responsibility of everyone involved in a system. In the aviation industry, we know that looking at safety holistically and creating redundancy is essential to preventing mistakes that could lead to fatal accidents.

Question 1. How do we create redundancy in safety measures to prevent fatalities on our roads?

Answer. Redundancy is a key principle in the safe system approach. Each of the Federal and state agencies mentioned is responsible for part of the system, but no agency has decision-making authority for all of the surface transportation system. At a minimum, there must be deliberate and better communication between the agencies at the executive level, but perhaps more critically at the staff level. The staff are ultimately the ones who know what interventions work to address specific problems on our roadways and how they can provide that level of redundancy.

Question 2. What safety features can be incorporated into vehicle and road design to ensure that one human error does not lead to a deadly accident?

Answer. That is the question that should be asked for every challenge we face—how do we prevent a mistake by a driver, pedestrian, bicyclist, or motorcyclist from becoming a fatality? This is another principle of the safe system approach—we are human, we will make mistakes, but no one should die because of a mistake.

I will give you one example of vehicle and infrastructure interventions to address a particular type of crash—running off the edge of the roadway and striking a rigid object. We need good edge lines, may use rumble strips or rumble stripes, include

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[9] Torbic, D. J., Hutton, J. M., Bokenkroger, C. D., Bauer, K. M., Harwood, D. W., Gilmore, D. K., Dunn, D. K., Ronchetto, J. J., Donnell, E. T., Sommer III, H. J., Garvey, P., Persaud, B., & Lyon, C. (2009). NCHRP Report 641: Guidance for the Design and Application of Shoulder and Centerline Rumble Strips, Transportation Research Board, Washington D.C. *https://cmfclearinghouse.fhwa.dot.gov/studydocs/nchrp_rpt_641-GuidanceRumbleStrips.pdf*

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a paved shoulder for recovery area, and may have a guardrail to prevent striking that object.[9,12-13] In the vehicle, we now have technology to provide lane departure warnings and lane-keeping systems. These interventions support each other to prevent that run-off-road collision.[14]

Question 3. How does a safe system approach protect all the people who use our roads, including pedestrians and people riding on transit?

Answer. Another principle of the safe system approach is to ensure safety for ALL road users. We have clearly failed the most vulnerable on our roadways—pedestrians, bicyclists, and motorcyclists—whose deaths have increased 49 percent in the 10-year period from 2014 to 2023. From planning to design to operations, we have to consider the context of the environment, including factors like who the road users are, what types of vehicles use the road, and if the environment is rural or urban. That context can then be used to build a safety matrix of feasible infrastructure, vehicle, speed, behavior, and post-crash care interventions that will protect all road users.

RESPONSE TO WRITTEN QUESTION SUBMITTED BY HON. LISA BLUNT ROCHESTER TO DR. DAVID HARKEY

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