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Science
THE HUMMINGBIRD AS WARRIOR: EVOLUTION OF A FIERCE AND FURIOUS BEAK

Winsomely captured in poems and song, the birds are yielding new secrets about their astounding beaks and penchant for violence.

By James Gorman

The beak of a male tooth-billed hummingbird, found in the forests of Colombia, is adapted for battle. Kristiina Hurme

If you want to know what makes hummingbirds tick, it’s best to avoid most poetry about them.

_Bird-beam of the summer day,_
—Whither on your sunny way?

Whither? Probably off to have a bloodcurdling fight, that’s whither.

John Vance Cheney wrote that verse, but let’s not point fingers. He has plenty of poetic company, all seduced by the color, beauty and teeny tininess of the hummingbird but failed to notice the ferocity burning in its rapidly beating heart.

The Aztecs weren’t fooled. Their god of war, Huitzilopochtli, was a hummingbird. The Aztecs loved war, and they loved the beauty of the birds as well. It seems
they didn’t find any contradiction in the marriage of beauty and bloodthirsty aggression.

Scientists understood that aggression was a deep and pervasive part of hummingbird life. But they, too, have had their blind spots. The seemingly perfect match of nectar-bearing flowers to slender nectar-sipping beaks clearly showed that hummingbirds were shaped by co-evolution. It seemed clear that, evolutionarily, plants were in charge. Their need for reliable pollinators produced flowers with a shape that demanded a long slender bill. Hummingbird evolution obliged.

But hummingbirds also heard the call of battle, which demanded a different evolutionary course. Some of those slender, delicate beaks have been reshaped into strong, sharp and dangerous weapons.

In a recent paper organizing and summing up 10 years of research, Alejandro Rico-Guevara and his colleagues at the University of California, Berkeley, shared evidence gathered by high-speed video about how the deadly beaks are deployed in male-to-male conflict.

Like the horns of bighorn sheep or the giant mandibles of stag beetles, hummingbird beaks are used to fight off rivals for mates. This is sexual selection, a narrow part of natural selection, in which the improvement of mating chances is the dominant force.

The males use their bills to stab other males, and to fence — feinting and parrying, sometimes knocking the other bird off a perch. Some hummingbirds even have hooked beaks, with serrations that look like shark’s teeth. Dr. Rico-Guevara’s high-speed video shows males tearing out another bird’s feathers with those grippers.

This is only one of several findings by Dr. Rico-Guevara and others that have recently changed the way hummingbirds are understood, including the unusual way they process sugar, the way they use their tongues in nectar drinking, and the evolution of bill shape.

Douglas Altshuler, an ornithologist at the University of British Columbia, in Vancouver, said that Dr. Rico-Guevara’s thoroughness and attention to detail have pushed research on hummingbirds to new levels of excellence. “I think the body of work is great,” he said.

Richard Prum, an ornithologist at Yale who studies the kind of evolution that produces extreme male characteristics, described the research as spectacular: “Love this guy, love his work.”

Dr. Rico-Guevara began his study of hummingbirds as an undergraduate at the National University of Colombia. His adviser was Gary Stiles, a leading expert on hummingbirds, under whose tutelage Dr. Rico-Guevara wrote an honors thesis on how hummingbirds hunt insects to supplement their diet of nectar, which is pure sugar.

At about the same time, Margaret A. Rubega, an evolutionary biologist at the University of Connecticut, published a paper in Nature on the way hummingbirds bend their bills to capture insects. One thing led to another, and Dr. Rico-Guevara ended up at UConn, doing his Ph.D. research with Dr. Rubega on hummingbird tongues.

The research on hummingbird tongues was groundbreaking. The dominant idea about how the birds suck up nectar was that the shape of the beak and the tongue produced capillary action, in which liquid rises against gravity because of mechanical forces.

This is what happens when a narrow tube is inserted into liquid, or when a brush soaks up paint even though only the tip is in the liquid.
Dr. Rico-Guevara and Dr. Rubega showed instead that the hummingbird’s feeding method was completely different: As the forked tip of its tongue is withdrawn up the narrow bill, it traps nectar.

All hummingbirds fight, including females, but only a few species have weaponized bills. Dr. Rico-Guevara found that males wage their battles to claim the best mating territories.

In some species, males assemble in areas called leks, away from the flowers that they feed on. In a lek, each male has a territory, and the females shop around. The territories vary quite a lot in size, but about 270 square feet is typical — the size of a very small New York City apartment. Central territories are the most prized, and a swordlike bill helps a male capture and keep that prime real estate.

In other hummingbird species with weaponized beaks, males set up mating territories right on the richest patches of flowers, again fighting off rivals. For them, Dr. Rico Guevara said, it doesn’t really matter if they aren’t the most efficient nectar-drinkers — “just don’t let anybody else get to the flower.”

**Extremists with wings**

Hummingbird research is a rich, growing field, delving into everything from aerodynamics to how the birds process sucrose.

“In things that you can measure in any animal, like metabolism, they’re extreme,” said Dr. Altshuler. “Another way they’re extreme is in terms of their specialization.”

Hummingbirds also offer “opportunities to explore the limits of physiology,” Dr. Rico-Guevara said. They have the highest metabolic rate among vertebrates, and they specialize in hovering, “the most expensive form of locomotion in nature.”

Hovering, coincidentally, is a form of flight that is of intense interest to the designers of flying robots. “Everybody wants to replicate hummingbird flight,” he said.

The birds are also great to use in experiments, said Chris Clark, a biologist at the University of California, Riverside, who has collaborated with Dr. Rico-Guevara in studies of hummingbird flight.

The birds will fly readily to feeders. The presence of humans does not put them off. And, “they fly really well in wind tunnels and cages.”

Hummingbird behavior is also of interest because they have been shown to be excellent learners. Dr. Clark said there is speculation that because they live on the edge in terms of their energy budget, they may require a great memory for where the food sources are.

In listing multiple areas of interest for studying hummingbirds, Dr. Rico-Guevara conceded that he’s attracted to them for another reason.

“What has kept me attached to them is their incredible personality,” he said. “They are very bold. They come to you to explore what you are doing. They are inquisitive.”

He can only hope that in his science, “My curiosity would match their curiosity.”

And he does have some poetic company. Not all poets got stuck on the beauty of the birds. D.H. Lawrence, in “Humming-Bird” imagines an ancient one at the dawn of creation.

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**Probably he was big**

As mosses, and little lizards, they say, were once big.

**Probably he was a jabbing, terrifying monster.**
HURRICANES MAY KILL SOME BIRDS, BUT HUMANS ARE THE REAL THREAT

The Bahama parrot’s numbers are not what they should be, ornithologists say, but they probably fared better in Hurricane Dorian than, say, the Bahama nuthatch.

By James Gorman

In a catastrophic hurricane like Dorian, the loss of lives and homes can be overwhelming. But even in the midst of devastating sadness and disbelief, a far less urgent but perennial question can tug at the back of the mind. What is the impact of these storms on wild creatures, like birds?

It is too soon to know the extent of Dorian’s impact, and really too soon to ask. Ecological post-mortems suggest that many birds are resilient, and that when a hurricane does push a species over the brink, it is almost always a species that we have put there in the first place.

If what we’re worried about is extinction, “we’re the driving force,” said David Steadman, curator of ornithology at the Florida Museum of Science, who has done a vast amount of research on Caribbean birds.

By destroying the environments where birds live, introducing alien predators and damaging the environment in other ways, humans gradually put birds, and of course other species, at risk. A hurricane or another disaster may deliver a final punch, but it is not the underlying cause of extinction. Christopher Elphick, an ornithologist at the University of Connecticut and one of the authors of the new paper, said development and sea level rise, both caused by humans, are the slow and sure killers.

He compared it to heart disease: “Eating just a little too much fat in your diet is what causes the heart attack. But shoveling snow is what pushes you over the edge.”

Birds do die in hurricanes, of course, and suffer other indignities. Dorian blew some to Nova Scotia. And some were spotted hiding out in the hurricane’s eye. Who knows where they ended up. Fortunately, Hurricane Humberto, which had people in the Bahamas worried about a second hit, took another path over the weekend.

Scientists concentrate on species and subspecies. In terms of the Bahamas, only speculation is possible at the moment. One species on the extreme edge, the Bahama nuthatch, only one or two of which were known to be living...
before Dorian, may well have been pushed to extinction. Others that are in trouble, like the Bahama parrot, may have suffered little impact.

Diana Bell of the University of East Anglia said that researchers from her lab found a Bahama nuthatch last year. That’s one single bird. She said another team reported finding two.

The Bahama nuthatch was already thought to be extinct before Dorian hit, and the hurricane nailed Grand Bahama, where one or two nuthatches may have still been alive.

“This could have been the coup de grâce for the nuthatch,” Dr. Steadman said.

Dr. Steadman, who has been researching birds in the Caribbean and elsewhere for many years, said that in contrast the Bahama Parrot — which is in trouble, but not as severely — may have done just fine.

Much of the parrot population dwells on the south of the island, which was hit but not devastated. And the parrots nest in cavities in the island’s limestone, and no doubt would have hunkered down during the storm. “I would doubt if there’s so much negative impact on that parrot population at all,” he said.

Other birds that are struggling there are the Bahama swallow and the Bahama oriole.

Past hurricanes have hit certain bird populations very hard, but selectively. Hurricane Hugo in 1989 brought Category 5 winds to the Francis Marion National Forest in South Carolina that knocked down the old growth nesting trees of the red-cockaded woodpecker. The bird nests in tree cavities in old-growth forests, and the storm snapped old trees in two. Eighty-seven percent of the forest’s 1,765 cavities were destroyed.

Joseph M. Wunderle Jr. of the United States Forest Service, who is based in Puerto Rico, said the managers of the forest responded with artificial cavities to help save the woodpeckers that remained.

Dr. Wunderle has studied and written about Caribbean birds and hurricanes for decades. Hurricane Maria, he said may have knocked out a group of Puerto Rican parrots that live at a high elevation. “The official count now is two birds in the Luquillo Mountains,” he said. The power of the hurricane played a role. Colleagues of his told him that when Maria came in at night as a strong Category 4 hurricane in September 2017, it killed 17 of 20 parrots wearing tracking devices. “They found them dead under fallen trees and tree branches,” he said.

The St. Kitts bullfinch also fell victim to hurricanes in the late 19th century, Dr. Wunderle said. The bird survived for a while and disappeared, he said. It had lived in a mountain forest on St. Kitts, feeding on fruits and seeds, and the plants took a long time to recover. Why didn’t it move to the lowlands? At lower elevations wild areas had been replaced with fields of sugar cane. By humans.

Insect eaters do a lot better, Dr. Wunderle said. Even if adult insects are lost in a hurricane, there are eggs, pupae, larvae. And there is a lot of dead wood, which many insects love.

The Cozumel thrasher is another example. The island was hit by Hurricane Gilbert in 1988 and Hurricane Roxanne in 1995. The introduction of alien predators to the island may have contributed to its disappearance.

When bird populations are reasonably widespread, they can, however, be quite resilient in the long term.

Dr. Elphick, his colleague Chris Field and other researchers from the University of Connecticut were inspired to look at the effects of catastrophic storms on marsh
birds because they were in the midst of surveying bird populations in Eastern coastal marshes when Hurricane Sandy struck in 2012.

They were surprised to see that the effect on bird populations was not that great. Individual birds certainly suffered, and that often prompts an immediate reaction from both the public and scientists. “People see dead birds and say, oh my God,” Dr. Elphick said. But individual deaths don’t necessarily mean trouble for the species.

Their team wanted to understand the long-term prospects for bird species over 20 years after a disaster. They created a computer model and after putting in data on the size of a population, its pattern of reproduction and other factors, they ran simulations to see how bad a species would have to be hit by a disaster for it to have an effect on its long-term prospects.

They looked at four birds: the clapper rail, willet, saltmarsh sparrow and seaside sparrow. For saltmarsh sparrows and clapper rails, almost all adults had to be killed for there to be a change in the long-term prospects of the population. The seaside sparrows and willets weren’t quite as robust, but they still needed to experience reproductive failures of more than 75 percent for their long-term survival to be threatened.

In general the team found that the coastal birds they studied are highly resilient to individual storms. They believe their simplified model — which concentrates on deaths and reproductive failures, not the strength of storms — could be useful for projecting what is likely to happen to other species facing disasters.

Of course, Dr. Elphick said, “there are two big caveats to our general result.” The species they studied are very small, or very localized. And that, of course, is exactly the situation for island birds, particularly where humans have changed the environment.

Climate change may bring an increase in frequency and strength of hurricanes that could change their calculations somewhat, Dr. Elphick said. But the biggest threats to the birds he studied are the gradual erosion of habitats by human development and, for marsh birds, development of the marshes where they live, and rising sea levels, which make average tides and storms more dangerous during nesting periods.

Development and rising sea levels are, of course, caused by us. As Dr. Bell put it: “Birds evolved to withstand hurricanes. They didn’t evolve to withstand destruction by humans.”
IN DEFENSE OF SEA GULLS: THEY’RE SMART, AND THEY CO-PARENT, 50/50 ALL THE WAY

Besides, if people weren’t such slobs, gulls would never have learned about French fries.

By James Gorman

Here are three good things about gulls: They are devoted parents. Males share child care equally with females. That includes sitting on the eggs during incubation. And they have figured out a way — actually many ways — to survive in a harsh and unforgiving world. Some eat clams, some eat fish, some are attracted to landfills. Of course, a few will divebomb you at the beach or boardwalk to steal a French fry, or the cheese on your cracker, or an entire slice of pizza. The beach pirate approach to survival is, of course, where humans and gulls clash. And the outcry from humans is almost as loud and outraged as the cries of the gulls themselves. Several recent news articles have chronicled the predations of gulls and some possible remedies. Ocean City, N.J., is bringing in hawks, and some scientists have suggested staring directly at gulls to fend them off. Though that is hard to do when the birds sneak up behind you as you are putting cheese on a cracker. There are some reports of more serious trouble. In England, a woman said a gull carried off her Chihuahua, and in Russia a pilot was hailed as a hero for safely landing his plane after a collision with a flock of gulls. In the New York area, thousands of birds, including gulls, have been killed in the decade since the Miracle on the Hudson crash to clear the skies for airplanes, without an apparent reduction in bird strikes. But it’s at the beach where tempers flare most predictably. And in times like these, with heightened human-gull tensions, very little has been written about the gulls’ point of view. Is there a Lorax who speaks for the gulls? Admittedly, gulls have quite a strong voice of their own, it’s just that it’s pretty unintelligible to most of us. An ornithologist would seem to be the obvious choice. They like birds. I called Christopher Elphick at the University of Connecticut. He spends a lot of time studying sparrows, but has a soft spot for gulls. “They’ve found a way to succeed in the world,” he said. “So much biodiversity
is suffering and disappearing and being lost. A part of me wants to just celebrate the fact that there are some organisms that can adapt and do well."

There are more than 100 species of gulls worldwide, and they are doing well, by and large. Some live nowhere near the sea, which makes birders and ornithologists allergic to the common term sea gull, although renegade friends of common language have called this attitude “birdsplaining.”

A few, like the Ivory gull in the Arctic, which is near threatened, and the black-billed gull in New Zealand, which is endangered, are in trouble, but most are not.

The gulls that people are most likely to encounter on Northeastern beaches in August are herring gulls, great black-backed gulls, ring-billed gulls and laughing gulls. Some of their populations are declining, but that is probably because they reached historic highs in the 20th century.

Before that time, some of those gulls were not found in New York or New Jersey. Herring gulls were first spotted nesting on Long Island in 1931, for instance. They began to spread in the 1960s and peaked in the ‘80s.

Dr. Elphick said, and ornithologists and birders speculate, that the closing of open landfills like Fresh Kills on Staten Island may have something to do with the drop in numbers since then. “There’s many a birder, especially those who’ve been around for 20 to 30 years, who will complain about the closing of landfills and how it’s removed their best places to go watch gulls,” he said.

Dr. Sarah J. Courchesne has been part of a summer gull research program at the Shoals Marine Laboratory on Appledore Island, Me., since 2008.

She admits that the herring gulls and black-backed gulls there do not always take kindly to visitors. But these are breeding colonies, and the researchers take young birds off the nest, examine them and put identification bands on them.

“This is like somebody walked into your house in the night and picked up your child and tried to walk off with them,” she said. “You would be alarmed.”

As are the gulls. So much so that the volunteers wear bike helmets and sometimes ponchos. Gull poop can ruin a shirt.

“Some gulls are just kind of psycho and others are really chill,” she said. Some birds sit quietly on a nest and allow themselves to be lifted off by volunteers who check the babies.

And the same variation occurs in how any given gull makes a living. Thousands and thousands forage for clams, follow fishing boats and shop at the local landfills.

“We have gulls that are never seen on beaches and we know that because we have GPS loggers on them and they just never go near people,” Dr. Courchesne said. “They are 100 percent out at sea fishing for their own food.”

“I can’t deny that there are gulls that are stealing food,” she added. “And I can’t deny they are really good at it.”

But the thieves are specialists. And to give credit where it is due, they have worked at their trade. “If you’re dealing with a gull that is really talented at stealing food,” Dr. Courchesne said, “that gull has perfected the technique, possibly over the course of years.”

Also, the behavior that bothers humans so much begins with humans themselves.

“Everybody who goes to the beach and gets aggravated by a gull has previous humans to thank for it,” Dr. Courchesne
said. You may not have given the gulls food, but somebody else did, and gulls are fast learners. At nearby beaches on the mainland, she said, “You’ll see people drive up to the beach and they’ll just dump an entire container of French fries out their window so the gulls come.”

Dr. Elphick agreed. “We’re slobs,” he said. “If we didn’t leave food lying around, they wouldn’t be doing what they’re doing.”

Dr. Courchesne, a veterinarian, teaches biology at Northern Essex Community College as well as being one of the leaders of the gull program at Appledore. (Her students often volunteer for the gull program.) She came to gulls partly because she loved birds, and even in veterinary school she knew she would not be treating pets. “I don’t like dogs,” she said.

She often hears from the public, since a major part of the research at Appledore involves banding young gulls and getting reports about where they turn up. She tries to turn correspondents into gull admirers or, at least, gull tolerators.

“People say, so here’s a bird, it tried to steal my sandwich. It has a band on it so I guess you want to hear about it,” she said.

“We’ll tell them the whole history. Some of these birds are 12 to 15 years old.” She tells them how many offspring they have and what devoted parents they are, and how the “mother” that they saw may well have been a male helping his young.

Late August is “high time for harassment,” she said, because the young have fledged and their adult parents take them to foraging spots, which include beaches and boardwalks, to find food and to teach them the ropes. The gulls, like the humans, bring their whole families. “They’re being so pushy for food because they’re such committed parents,” she said.

“I have really come to love them,” she said. “They’re my favorite birds. They’re so scrappy and they’re overlooked.”

What does she recommend that the public do about gulls?

“I would recommend to people that they spend some time just bird watching,” Dr. Courchesne said. “Sit back and watch what they do.”

“If you give them a little time and devote your attention to them you will see this great intelligence behind that eye and this caginess, and this generalist sensibility that I think is very relatable to a human,” she said. “Because it’s kind of the same way we go through the world.”
AN OP-ED FROM THE FUTURE

SHOULD YOU ADD A MICROCHIP TO YOUR BRAIN?

You might risk losing yourself.

By Susan Schneider

Editors’ note: This is the third installment in a new series, “Op-Eds From the Future,” in which science fiction authors, futurists, philosophers and scientists write Op-Eds that they imagine we might read 10, 20 or even 100 years from now. The challenges they predict are imaginary — for now — but their arguments illuminate the urgent questions of today and prepare us for tomorrow. The opinion piece below is a work of fiction.

As artificial intelligence creates large-scale unemployment, some professionals are attempting to maintain intellectual parity by adding microchips to their brains. Even aside from career worries, it’s not difficult to understand the appeal of merging with A.I. After all, if enhancement leads to superintelligence and extreme longevity, isn’t it better than the alternative — the inevitable degeneration of the brain and body?

At the Center for Mind Design in Manhattan, customers will soon be able to choose from a variety of brain enhancements: Human Calculator promises to give you savant-level mathematical abilities; Zen Garden can make you calmer and more efficient. It is also rumored that if clinical trials go as planned, customers will soon be able to purchase an enhancement bundle called Merge — a series of enhancements allowing customers to gradually augment and transfer all of their mental functions to the cloud over a period of five years.

Unfortunately, these brain chips may fail to do their job for two philosophical reasons. The first involves the nature of consciousness. Notice that as you read this, it feels like something to be you — you are having conscious experience. You are feeling bodily sensations, hearing background noise, seeing the words on the page. Without consciousness, experience itself simply wouldn’t exist.

Many philosophers view the nature of consciousness as a mystery. They believe that we don’t fully understand why all the information processing in the brain feels like something. They also believe that we still don’t understand whether consciousness is unique to our biological substrate, or if other substrates — like silicon or graphene microchips — are also capable of generating conscious experiences.
For the sake of argument, let’s assume microchips are the wrong substrate for consciousness. In this case, if you replaced one or more parts of your brain with microchips, you would diminish or end your life as a conscious being. If this is true, then consciousness, as glorious as it is, may be the very thing that limits our intelligence augmentation. If microchips are the wrong stuff, then A.I.s themselves wouldn’t have this design ceiling on intelligence augmentation — but they would be incapable of consciousness.

You might object, saying that we can still enhance parts of the brain not responsible for consciousness. It is true that much of what the brain does is nonconscious computation, but neuroscientists suspect that our working memory and attentional systems are part of the neural basis of consciousness. These systems are notoriously slow, processing only about four manageable chunks of information at a time. If replacing parts of these systems with A.I. components produces a loss of consciousness, we may be stuck with our pre-existing bandwidth limitations. This may amount to a massive bottleneck on the brain’s capacity to attend to and synthesize data piping in through chips used in areas of the brain that are not responsible for consciousness.

But let’s suppose that microchips turn out to be the right stuff. There is still a second problem, one that involves the nature of the self. Imagine that, longing for superintelligence, you consider buying Merge. To understand whether you should embark upon this journey, you must first understand what and who you are. But what is a self or person? What allows a self to continue existing over time? Like consciousness, the nature of the self is a matter of intense philosophical controversy. And given your conception of a self or person, would you continue to exist after adding Merge — or would you have ceased to exist, having been replaced by someone else? If the latter, why try Merge in the first place?

Even if your hypothetical merger with A.I. brings benefits like superhuman intelligence and radical life extension, it must not involve the elimination of any of what philosophers call “essential properties” — the things that make you you. Even if you would like to become superintelligent, knowingly trading away one or more of your essential properties would be tantamount to suicide — that is, to your intentionally causing yourself to cease to exist. So before you attempt to redesign your mind, you’d better know what your essential properties are.

Unfortunately, there’s no clear answer about what your essential properties might be. Many philosophers sympathize with the “psychological continuity view,” which says that our memories and personality dispositions make us who we are. But this means that if we change our memories or personality in radical ways, the continuity could be broken. Another leading view is that your brain is essential to you, even if there are radical breaks in continuity. But on this view, enhancements like Merge are unsafe, because you are replacing parts of your brain with A.I. components.

Advocates of a mind-machine merger tend to reject the view that the mind is the brain, however. They believe that the mind is like a software program: Just as you can upload and download a computer file, your mind can add new lines of code and even be uploaded onto the cloud. According to this view, the underlying substrate that runs your “self program” doesn’t really matter — it could be a biological brain or a silicon computer.

However, this view doesn’t hold up under scrutiny. A program is a list of instructions in a programming language that tell the computer what tasks to do,
and a line of code is like a mathematical equation. It is highly abstract, in contrast with the concrete physical world. Equations and programs are what philosophers call “abstract entities” — things not situated in space or time. But minds and selves are spatial beings and causal agents; our minds have thoughts that cause us to act in the concrete world. And moments pass for us — we are temporal beings.

Perhaps advocates of the software view really mean that the mind or self is just the thing running the program — but this just takes us right back to where we started: What is this thing, this self? Why be confident that it survives enhancements like Merge, or even less radical enhancements, like Zen Garden and Human Calculator? Both of these enhancements still involve major augmentations of certain cognitive capacities. Such changes may, for all we know, alter one’s personality and brain function in significant ways.

This leads me to suspect there may be a second kind of design ceiling on radical brain enhancement. The first design ceiling arises if microchips fail to underlie conscious experience — let’s call this the “consciousness ceiling.” This second ceiling, in contrast, involves the survival of the self. This “self ceiling” is a point beyond which the person who attempts to enhance is no longer the same individual as before, for the procedure causes that individual who sought enhancement to cease to exist. Because the nature of the self is so controversial, we don’t know if there’s a self ceiling. Nor do we know how high, or low, a self ceiling would be situated.

These potential ceilings suggest that we should approach the idea of merging with A.I. with a good deal of humility. Technological prowess is not enough. To flourish, we must appreciate the philosophical issues lying beneath the algorithms.

Susan Schneider is the author of “Artificial You: A.I. and the Future of Your Mind” and the director of the A.I., Mind and Society Group at the University of Connecticut.
Typically, humans have sent satellites into space to hunt for the most otherworldly and mysterious objects: black holes, quasars and exoplanets. But at least one NASA-funded team is using our eyes in the sky to study one of the most worldly and least mysterious objects: they’re using satellites in space to monitor massive penguin poop stains.

The krill-heavy diet of Adélie penguins, which live on the coast of Antarctica and the remote islands nearby, turns their guano a striking pink color. When contrasted with surrounding snow, the guano shows up pretty well in LandSat images. Brian Resnick at Vox reports that researchers at the American Geophysical Union conference recently explained how they are using those images to find remote penguin colonies and even reconstruct the diet and history of the colonies over time.

The satellite images don’t show individual penguins, since they are much too small to be seen. But the immense accumulation of bright pink poo is relatively easy to spot, which allows researchers to calculate the colony’s size.

“Male and female penguins take turns incubating the nest. The guano left behind builds up in the same areas occupied by the nests themselves,” co-investigator Heather Lynch, an ecologist at Stony Brook University says in a NASA press release. “We can use the area of the colony, as defined by the guano stain, to work back to the number of pairs that must have been inside the colony.”

Yasemin Saplakoglu at LiveScience reports that the team spent 10 months poring over clear satellite image of Antarctic islands to create a global survey of the species. The team thought they’d done a thorough job, but once they started using an algorithm to help them find poop-peach colored pixels, they discovered they’d missed quite a few of the waddling birds. In particular, they’d overlooked a massive 1.5 million strong colony on Heroina Island in the remote Danger Islands. When a team traveled to the suspected roost, they found the computer was indeed right and the island was teeming with the birds.

“We thought that we knew where all the [Adélie] penguin colonies were,” Lynch
said during a new conference. “We, I think, had missed it in part because we hadn’t expected to find them there.”

The team is reviewing satellite images dating back to 1982 to learn about the population rise and fall of individual Adélie colonies. They’ll also examine the color of the massive skid marks to learn about the penguins’ diets over time. When the penguins are munching on fish, their guano tends to come out white, but the more krill they eat the pinker the waste becomes.

To test their idea, the team collected guano from the colonies, which it turns out is not as fun as it might sound.

“Penguin guano almost has the consistency of a wet tuna salad,” co-investigator Casey Youngflesh, a postdoc at the University of Connecticut, tells Resnick. “The guano has a pungent fishy scent and is definitely not pleasant. It’s something you just have to learn to cope with.”

After powering through the stench and analyzing the guano, the team found that their diet estimates from the satellite images correspond pretty closely with what the penguins are actually eating. However, when they compared the diet data with fluctuations in colony size, they were surprised to find there was no strong connection.

“It is interesting that no obvious trend in diet was seen over time, despite changes in the physical environment,” Youngflesh says in the press release. “This was a big surprise, since the abundance and distribution of Adélie penguins has changed dramatically over the last 40 years and scientists had hypothesized that a shift in diet may have played a role.”

In fact, some colonies have seen dramatic population crashes, while others have remained stable or grown larger, and researchers would like to understand these changes better. Getting a handle on the size of the colonies and their natural fluctuations over time is the first step to understand what is happening. That will help researchers manage and protect the penguins as more man-made threats, including climate change and krill fishing, which harvests the tiny crustaceans for the health supplement industry, put more pressure on their nesting grounds.
FLASHING NEURONS, INVISIBLE MOONLIGHT AND ADORABLE SQUID BABIES: THE WEEK’S BEST SCIENCE GIFS

Enjoy and loop on

By Kelso Harper

MESMERIZING MOLLUSKS

These adorable little blobs are Hawaiian bobtail squid, just 12 hours old. Born in a lab at the University of Connecticut, the tiny cephalopods help scientists learn about symbiotic relationships in nature. Bobtail squid have a special connection to light-producing bacteria called Vibrio fischeri. They give the microbes a home in their light organ and are repaid for the favor with a sly camouflage technique. When the squid hunt at night, the bacteria light up to disguise them from predators below, who see the glowing blob as another star in the sky. Researchers at the university say they want to better understand this interaction and other squid-bacteria relationships.
Don't be fooled by caterpillars with colorful and fuzzy exteriors: They might be poisonous.

Stinging, venomous caterpillars have plagued the South and parts of the Midwest.

In Michigan, the Clare County Chamber of Commerce issued a warning Oct. 10 for residents to avoid the American dagger moth caterpillar, which was spotted on a college campus.

The puss caterpillar – one of the most venomous of its kind in the USA – has appeared in Florida, Texas and South Carolina. A Florida woman posted on Facebook that she was hospitalized after receiving a painful sting from one of these critters.

Generally, stinging caterpillars – mainly the puss caterpillar, also known as the Southern flannel moth or the asp – are rare north of the Mason-Dixon Line, says David Wagner, an entomologist at the University of Connecticut. Even in the South, where they’re most frequently spotted, they’re uncommon, he says.

When these caterpillars sting, the symptoms can range from mild discomfort to severe pain that can last hours.

Stings from the American dagger can cause itching and burning sensations that can turn into a severe rash. Puss caterpillars’ spines can cause a “nasty” reaction, Wagner says, causing severe pain and leaving behind a hematoma, a swelling of blood on the skin.

“It’s not an instantaneous shock of a hornet or wasp, but it builds for a long time in a frightening way,” Wagner tells USA TODAY. “No one expects stings to gain in impact or discomfort, and these will, even up to an hour later. It packs quite a wallop.”

He says a puss caterpillar sting can cause joint pain akin to “serious arthritis” long after the pain from the initial contact has subsided.

How to spot a venomous caterpillar

Caterpillars that are brightly colored, have spines or hairs are probably venomous and should not be touched.

“If it is in a place where it can cause problems, clip off the leaf or use a stick to relocate it,” Ric Bessin, an entomologist at the University of Kentucky College of Agriculture, tells USA TODAY.

Bessin says some caterpillars’ venomous
spines and hairs came about as a defense mechanism against predators. So did their brightly colored exteriors, a phenomenon known as aposematic coloration, Wagner says.

Puss caterpillars have a hairy light-brown coat that Wagner describes as “super soft and cuddly.” American dagger moth caterpillars are bright yellow-green with black bristles that resemble eyebrows.

It’s a warning sign for predators, Wagner cautions.

Caterpillars with these exteriors can brazenly linger on leaves and other foliage without being attacked. Underneath the exterior of the puss caterpillar are small spines that break off; the rear ends of the American dagger moth caterpillars have bristles that embed in skin.

Instead, very carefully remove the caterpillar with a stick or another object, Bessin advises.

Once the caterpillar has been removed, take a shower, Wagner suggests. “Wash away the hairs and cool down. That might help the allergenic reaction,” he said.

Wash your contaminated clothes as well, as a few hairs or spines might remain.

Wagner says don’t panic over toxic caterpillars.

“I’ve been in the business for 30 years, and it will be one of the most miserable days of your life, for sure.” he says. “But it’s so infrequent as to not be worth worrying about.”

What to do if you come into contact with a venomous caterpillar

The most crucial advice Wagner and Bessin offer is not to brush the caterpillar from your skin. Swatting off the caterpillar makes it more likely that the venomous hairs or spines will be left on your clothing.

Puss caterpillars may look innocuous, but they have venom injectors that pack “quite a wallop,” says University of Connecticut entomologist David Wagner. Ricardo Bessin
Nobody likes a cockroach in their house. But before you smash the unwelcome intruder, consider this: that six-legged critter might one day save your life.

That’s right. Insects—long known to spread diseases—could potentially help cure them. Or rather, the microbes living inside them could. Scientists have discovered dozens of microorganisms living in or on insects that produce antimicrobial compounds, some of which may hold the key to developing new antibiotic drugs.

They can’t come too soon. More infections are becoming resistant to common antibiotics, and the pipeline of new antibiotic drugs has slowed to a trickle.

“There is a growing demand [for antibiotics], and a diminishing supply,” explains Gerry Wright, who directs the Michael G. DeGroote Institute for Infectious Disease Research at McMaster University.

Most antibiotic drugs have been discovered from bacteria living in the soil. But Cameron Currie, professor of bacteriology at the University of Wisconsin-Madison, says that searching the soil for new antibiotics has become increasingly futile.

“They keep finding already known antibiotics,” Currie says. “There’s a common sentiment that the well of antibiotics from soil... is dry.”

Fortunately, there may be another well. Currie and a team of 28 researchers recently published a paper in Nature Communications showing that some of the bacteria living in insects are really good at killing the germs that make people sick.


Microbial fighters
Each insect contains an entire ecosystem of microorganisms, just like the microbiome found in humans. And there’s one quality that many of those insect-associated microbes have in common, says Jonathan Klassen, assistant professor of molecular and cell biology at the University of Connecticut and an author on the study.

They don’t get along with each other very well.

And by don’t get along, he means they’re constantly trying to kill each
other through biochemical warfare. Many of the microorganisms in insects make compounds that are toxic to other microbes—essentially, natural antibiotics.

Some of those natural antibiotics attracted Currie's attention while he was a student, researching leaf cutter ants. Leaf cutter ants are among nature's most prolific gardeners. They actually don't eat the leaves they cut — instead they use them to cultivate a special type of fungus for food. Still, it's not easy being a fungus farmer.

"Like human agriculture, the ants have problems with disease," Currie says. "I found a specialized pathogen that attacks their fungus garden."

Fortunately, the ants have a tool to deal with the problem. A species of bacteria living on the ants' exoskeletons produces a toxin that kills the pathogen. Like the pesticides a gardener uses, the toxin keeps the ants' garden disease-free.

The discovery inspired Currie's curiosity. If ants could use these bacterial compounds to treat disease in their fungus gardens, could doctors use them to treat disease in people? If so, what other insects might also be carrying disease-fighting microbes?

To answer those questions, Currie and his team spent years collecting thousands of insects, including cockroaches, from Alaska to Brazil.

"Every few months somebody would be going out somewhere to collect something," remembers Klassen, who was working at the time as a postdoctoral researcher on the project.

The team tested bacteria from each insect to determine if they could kill common human pathogens, such as E. coli and methicillin-resistant Staphylococcus aureus (MRSA). They then compared the results from strains of insect bacteria to strains drawn from plants and soil.

"We were really surprised that [insect strains] were not just as good, but apparently better at inhibiting [pathogens]," Currie says.

### Testing a new antibiotic

Once a scientist has discovered that a strain of bacteria can kill germs, the next step in drug development is to determine what bacterial compound is responsible for the antimicrobial activity—like a cook searching for the secret ingredient in a particularly delicious soup.

Currie's team had found dozens of promising bacterial strains in insects. And each could yield a secret ingredient that might be a new antibiotic compound.

That in itself was a big accomplishment. But the researchers went a step further. They isolated one compound from one particularly promising bacterial strain and showed that it could inhibit fungal infections in mice, an important step in drug development.

The compound, cyphomycin, is found on Brazilian fungus-farming ants, close relatives of the ants Currie studied as a PhD student. Though it's far from becoming an approved drug, the research shows that antibiotic compounds new to science can be isolated from insects.

Wright, an antibiotic researcher who did not participate in the study, says that previous research has shown that single insect species contained antimicrobial compounds. But this is the first study to comprehensively demonstrate that insects as a group are a promising source of new antimicrobials.

"No one's ever done something on this scale before," Wright explains.

Currie is hopeful that cyphomycin may
one day be approved to treat yeast infections in people. But before that happens, it must undergo years of further testing.

“It [cyphomycin] is a million miles away [from approval],” Wright says. “That’s the reality of drug discovery.”

Still, Wright says the researchers have already overcome one of the toughest hurdles in drug development by demonstrating that the compound works in mice.

For Klassen, the stakes are too high not to try.

“Efforts such as this study are crucial to keeping the antibiotic pipeline flowing so that disease doesn’t gain the upper hand,” he says.

In the end, the consequences of a world without antibiotics are enough to make scientists look for new drugs in unconventional places—even if that means looking in a cockroach.

The farther you get from the equator, the less effective solar panels become at reliably generating power all year round. And it’s not just the shorter spans of sunlight during the winter months that are a problem; even a light dusting of snow can render solar panels ineffective.

As a result of global warming, winters are only going to get more severe, but there’s at least one silver lining as researchers from UCLA have come up with a way to harness electricity from all that snow.

The technology they developed is
called a snow-based triboelectric nanogenerator (or snow TENG, for short) which generates energy from the exchange of electrons. If you’ve ever received a nasty shock when touching a metal door handle, you’ve already experienced the science at work here. As it falls towards earth, snowflakes are positively charged and ready to give up electrons. In a way, it’s almost free energy ready for the taking, so after testing countless materials with an opposite charge, the UCLA researchers (working with collaborators from the University of Toronto, McMaster University, and the University of Connecticut) found that the negative charge of silicone made it most effective for harvesting electrons when it came into contact with snowflakes.

Details about the device they created were shared in a paper published in the Nano Energy journal, but it can be 3D-printed on the cheap given how accessible silicone is—for five bucks you can buy a spray can of it at the hardware store as a lubricant. In addition to silicone, a non-metal electrode is used, which results in the triboelectric generator being flexible, stretchable, and extremely durable.

Its creators believe it could be integrated into solar panel arrays so that when blanketed with snow in the winter months, they could continue to generate power. But the triboelectric generator has other potential uses too. Since it doesn’t require batteries or charging, it could be used to create cheap, self-powered weather stations that could report back snowy conditions and how much has accumulated. It could also improve activity trackers used by athletes competing in winter sports, allowing the movements of individual skis to be tracked and recorded which would provide valuable insights for athletes as they train to perfect their form.
CLIMATE CHANGE, OXYGEN AND BIODIVERSITY: AMAZON RAINFOREST FIRES LEAVE PLENTY AT STAKE

“The effects of forest destruction in the Amazon don’t stay in the Amazon. They affect us all,” one expert said.

By Erik Ortiz

Record fires sweeping across the Amazon this month are bringing renewed scrutiny to Brazil’s deforestation policy and have environmental researchers and conservationists worried that the blazes will only aggravate the climate change crisis.

“The effects of forest destruction in the Amazon don’t stay in the Amazon. They affect us all,” said Robin Chazdon, professor emerita at the University of Connecticut who has studied tropical forest ecology.

Grabbing headlines this week has been the unsettling sight of heavy smoke blowing from some of the fires and reaching about 2,000 miles away, cloaking the Brazilian city of Sao Paulo in darkness during the day. The fires have inspired the hashtag #PrayforAmazonia, and have received attention from the likes of actor Leonardo DiCaprio, Democratic presidential candidate Bernie Sanders, rapper Lil Nas X and United Nations Secretary-General António Guterres.

But there’s more at stake than people might realize, Chazdon said.

“There are large negative consequences for climate change globally, as the fires contribute to carbon emissions,” she added. If the rainforests are “not allowed to regenerate or be reforested, they will not be able to recover their high potential for carbon storage.”

The vast swaths of rainforest play an important role in the world’s ecosystem because they absorb heat instead of it being reflected back into the atmosphere. They also store carbon dioxide and produce oxygen, ensuring that less carbon is released, mitigating the effects of climate change, scientists say.

But with fires ravaging vegetation, research shows it could take more than a century to recover the carbon storage that was lost.

“Forests can regrow following fires, but not if fires are repeated every few years and not if the land is converted to agriculture,” Chazdon said.

She added that the shrinking of the Amazon and its transition into scrubland “could bring a tipping point to forest functioning that is not easily reversible.”

The Amazon rainforest sprawls across
nine countries and is the largest rainforest in the world, about half the size of the United States. It has also been burning at a record rate, according to Brazil’s National Institute for Space Research, with more than 74,000 fires in Brazil alone this year, almost double the total for 2018.

According to an analysis of NASA data, in the last three months Brazil has had twice as many observed fires as in the same period in 2018.

This year has not been a particularly dry one, Chazdon said, so unusual drought does not explain why there have been so many conflagrations, although not all are large in scale.

Environmental groups have blamed the policies of Brazilian President Jair Bolsonaro, who took office in January, for rolling back environmental protections that have paved the way for the illegal clearing of forests in favor of cattle farming and agriculture. On Wednesday, Bolsonaro posted a video to Facebook blaming nongovernmental organizations for setting the blazes as a tactic to malign him, although he provided no evidence for the claim.

“There is a war going on in the world against Brazil, an information war,” Bolsonaro said.

The loss of more land could have a frightening effect in other ways, ecologists say.

Trees in the Amazon help to pump water from the soil into the atmosphere, carrying much-needed rainfall to other areas.

“These massive fires burning now reduce the resilience of the Amazon forest to future droughts and climate change at the same time that this forest is needed to mitigate against these threats,” Chazdon said. “Protection and restoration of Amazon forest has never been more urgent.”

Roel Brienen, a professor at the University of Leeds in England who has studied the Amazon basin for more than 15 years, said the current level of deforestation is worrying for what it means to the loss of biodiversity and the release of more carbon into the atmosphere.

“If we kill enough forest, we may be tipping the Amazon into a new, much drier state, and it may turn into a savanna,” Brienen said in an email. “This would be a great loss to our planet and almost means game over for our battle against climate change.”

He added that while such a doomsday scenario is still far off, it will take policy changes to be enacted now.

“Brazil can do as it has shown in the past, but only if there is political will,” Brienen said.

American conservationist Paul Rosolie, who has regularly traveled to the Amazon rainforest in Peru’s Madre de Dios region for 13 years, said these fires are of concern not just in Brazil but across the continent. He blames a decade of apathy toward deforestation for allowing the problem to fester.

“We’ve never seen it at this scale before,” Rosolie said, “and that’s what’s getting people scared. If your house was on fire, you’d call 911, but that’s not an option here.”

In addition to the climate, he said, he’s also worried about the biodiversity — the tens of thousands of tree species and plants and the hundreds of thousands of insects and other wildlife that inhabit the Amazon.

Each tree, he said, holds thousands of species, and he’s seen firsthand how fires have disrupted the largest of mammals to the smallest of leafcutter ants.

“As this fire is seeping through the Amazon, we’re losing millions and millions of animals,” Rosolie said.
GOVERNMENT-FUNDED RESEARCH INCREASINGLY FUELS INNOVATION

Almost one-third of U.S. patents rely on federal research

By National Science Foundation Public Affairs

By computing links between government grants and tens of millions of U.S. patents and scientific papers from 1926 to 2017, researchers have demonstrated that almost a third of patents in the U.S. rely on federal research. Although this may be a conservative estimate, this number has increased steadily over the past 90 years.

The results are published in the journal Science.

“Technological progress is seen as a process through which inventions build on one another,” says Hillary Greene of the UConn School of Law. “In this study we examine the importance of government-supported research as contributing to subsequent inventions.”

The study, the first of its kind, offers a holistic view of the effect of federal funding on innovation. Where previous studies established impacts in particular fields, the current work provides a historic and quantitative analysis of all U.S. patents over a lengthy period of time.

The research also establishes that corporations have steadily increased their reliance on federally supported research. The effect occurs across all fields; as one example, almost 60 percent of the patents in chemistry and metallurgy rely on federally supported research.

NSF’s Directorate for Social, Economic and Behavioral Sciences supported the study.

This article was published on June 26, 2019.
Earlier this month, a group of European researchers published a study announcing that we already have the technology to tackle climate change: trees.

The study, published in the journal Science, identified 1.7 to 1.8 billion hectares, or roughly 6.5 million square miles, of suitable land around the world not currently being used for agriculture or urban development that could be planted as forest (defined as land with at least 10 percent tree cover).

Adding cropland and urban areas to that would create another 5.4 million square miles of forest and another 2.7 million square miles of canopy. In comparison, the total land area of the United States, including Hawaii and Alaska, is 3.5 million square miles.

The results of such a huge eco-restoration would be massive. Once mature, the study argues, those forests would sequester about two-thirds of all the carbon released by humans since the start of the Industrial Revolution, and reduce atmospheric CO2 by 25 percent. “If we act now,” Thomas Crowther of ETH Zürich, senior author of the study, says in a statement, “this could cut carbon dioxide in the atmosphere by up to 25%, to levels last seen almost a century ago.”

But other ecologists and scientists aren’t as convinced. Researchers are only now beginning to understand how carbon cycles through the life span of forests, and reforestation is a process with many technical and political variables.

Karen Holl of the University of California, Santa Cruz, who has studied reforestation in the tropics for two decades, says she supports reforestation efforts, and they do have a place in fighting climate change. But she argues that the new paper is too simplistic and grossly overestimates the potential for reforestation to reduce CO2. Holl’s research shows the amount of carbon tropical forests can hold depends on a variety of factors, including the intensity of past disturbance by humans, invasive species, and wildfires.

Holl still sees huge potential in reforestation as a way to sequester carbon. “No one is disputing that,” she explains. “The question is how much. I have a 15-year study of tropical forest recovery in southern Costa Rica, and we see a huge range in the rates of recovery, both in planted and naturally regenerating sites. We find an order of magnitude difference at least in the
amount of carbon sequestered at our 12 sites across one area. Saying forests can sequester the maximum amount is overly optimistic.”

She also takes issue with the study's map, which she says shows areas that were traditionally grassland as potential reforestation sites. Not only would that destroy habitat for species that depend on grasslands, she argues, it's also a recipe for failure: Trying to grow forest on grassland habitat has traditionally been unsuccessful.

Attempts to reforest our way out of climate change have also resulted in questionable policies. In 2011, Germany and the International Union for Conservation of Nature launched the Bonn Challenge to reforest 150 million hectares, or 5.8 million squares miles across the globe, by 2020 and 350 million hectares by 2030. However, the 48 nations that agreed to the challenge are not on track to reach that 2020 goal. Half of the pledges so far, a recent study found, are for tree plantations, which release much of the CO2 they sequester back into the atmosphere every 10 to 20 years when the tree farms are logged. The authors of that study argue that the definition of reforestation should be tightened and only projects that allow forests to develop into their mature, diverse, carbon-capturing state be included.

The other problem with relying on reforestation to combat climate change is the timeline. Large-scale reforestation needs to occur almost immediately if it’s going to have an impact on the efforts to limit climate change to 1.5° or 2°C of warming. “[It] will take decades for new forests to mature and achieve this potential,” Crowther acknowledges. “It is vitally important that we protect the forests that exist today, pursue other climate solutions, and continue to phase out fossil fuels from our economies in order to avoid dangerous climate change.”

That's a sentiment echoed by Holl, who points out that deforestation has actually increased in places like Brazil while palm oil plantations in Southeast Asia drive deforestation in other tropical forests. Logging in the Canadian boreal forests has also ramped up in recent years. Any carbon sequestration gained from reforestation, says Holl, is moot if we’re still losing old growth, natural forests.

Another study that came out the day before Crowther's in the journal Science Advances argues that reforestation projects need to focus on the land that will yield the greatest rewards: namely, the tropics, where trees regrow much faster than in temperate regions and will have a quicker impact on atmospheric CO2. The Science Advances study identifies a more modest 100 million hectares of previously logged and cleared land in 15 tropical countries as a prime candidate for restoration.

But even restoring that amount of forest would take immense amounts of money, negotiations with private landowners, and lots of political will. “Restoration involves far more than simply planting trees,” ecologist and coauthor Robin Chazdon, professor emerita at the University of Connecticut, says. “It starts with the need for mutually beneficial agreements with those currently using the land and doesn’t end until forests host the rich diversity of plant and animal life that make them so awe-inspiring and valuable. But, fortunately, studies show it doesn’t take long for the benefits of new forests to kick in.”

Reforestation isn't just about putting as many trees into the ground as possible, writes Spencer Plumb, who works on reforestation issues with the National Forest Foundation, in an email about the study. His group works with silviculturists from the US Forest Service to make sure
they are reforesting species in the right habitat. Currently, that organization is developing a project to plant 50 million trees in US national forests. “Tree planting needs to be done not just as a way to sequester carbon but as a way to restore forested ecosystems, which provide wildlife habitat, clean water, and recreation opportunities,” he says.

When done without proper research, reforesting using the wrong trees or methods can be disastrous. In the 1980s, the Canadian government planted spruce trees in natural peat bogs in Alberta in the hopes of increasing timber harvests. The trees grew but dried out the bogs, which had also played a role in sequestering carbon. The result was the massive 2016 Fort McMurray Fire, which burned 1.5 million acres. Pine monocultures planted in the American West have turned out to be the perfect fuel for wildfires. In China, planting of non-native tree species significantly impacted groundwater supplies; in Japan, reforestation projects involving just one tree species have led to forests that are nearly devoid of other kinds of life.

In other words, restoration is complicated. We, and the planet, would be better served by a holistic approach that restores the entire ecosystem, not just the trees, and works hard to protect the forests we do have.

“Restoring forests is a good thing,” says Holl. “It’s a good thing for carbon capture, for conserving species, for water quality. But it’s just not a silver bullet. We can’t plant our way out of the climate crisis. There are certain places, like the Amazon, where we need to do whatever we can to keep existing forests that are there. It’s so much harder to get the forests back than protect what we have.”
The wildfires which hit northern California have become “too extreme” even for the black-backed woodpecker which thrives in burned out forests, according to scientists.

The bird, which lives in the mountainous areas of the western U.S., favors recently burned trees where it can feast on the larvae of wood-boring beetles that inhabit dead wood.

Fire is a natural part of forest ecology in the western U.S., co-author Andrew Stillman at the University of Connecticut explained to Newsweek.

But as megafires—large, severe wildfires spanning at least 10,000 hectares—are increasingly common in the U.S., scientists are trying to understand the ecological impact of these blazes, and predict whether they will become a natural part of forests or have unexpected negative effects on flora and fauna.

Over a period of eight years, researchers at the University of Connecticut, the Institute for Bird Populations and the U.S. Forest Service collected data on 118 nests in the parameters of six large wildfires in the Plumas and Lassen National Forests.

The woodpeckers were found to choose to nest in sites closer to the edges of “high severity” burn patches, where all or nearly all of the trees died in a fire, according to the authors of the study published in the journal The Condor: Ornithological Applications.

“The finding that the woodpeckers in our study tended to select nest sites closer to the edges of high severity burn patches provides added evidence that pyrodiversity [or having a range in the age, size and severity of burned patches in trees] benefits this species,” said Stillman.

The team thought the megafires might benefit the woodpecker, as the animals are linked with high severity areas where there are a lot of dead trees ready for nesting opportunities, Stillman said.

“However, it seems that the landscapes created by extra large, intense mega-fires are too extreme,” he argued.

“Even fire-associated species need variation in habitat and access to both live and dead trees.”

“However, our research also demonstrates that areas which
burned at a mix of different severities (considered ‘natural fires’) can have numerous benefits to wildlife,” Stillman said.

As mega-fires become the “new norm” in some western U.S. forests, the team predicts there will be less and less pyrodiversity, and more threats to forest wildlife.

To conduct their study on the “elusive” species, Stillman and colleagues from The Institute for Bird Populations and the U.S. Forest Service, had to overcome a number of challenges.

“We drove endless networks of unmaintained roads, battled up steep slopes, and hiked up to 10 miles off-trail each day. In three years of research alone, my crew and I had to change 19 flat tires,” Stillman said.

The researchers acknowledged the study was limited because their work was on 118 nests in one region. Next, the team hopes to look at other regions in the western U.S. and forest fires with different characteristics.

Asked if climate change is partly to blame for the new intensity of the wildfires, Stillman said it is “one of a myriad of factors that are contributing to the concerning trends we see in wildfire size and severity.”

Prolonged droughts, increase in spring and summer temperatures, snow melting earlier, changing rain patterns, and a history of fire suppression contribute to the trend, he added.

PEOPLE WITH ANEMIA ARE MORE LIKELY TO TRANSMIT DENGUE: STUDY

People with low iron levels in the blood are more likely to spread the deadly dengue virus.

By Press Trust of India

People with low iron levels in the blood are more likely to spread the deadly dengue virus, according to a study which suggests that patients taking iron supplements during the illness may limit the transmission of the disease by mosquitoes. Dengue fever, a disease spread mainly by the Aedes egypti mosquito causes fever, rashes, and
terrible aches, and can also lead to shock and death.

According to the World Health Organization (WHO), there are about 390 million cases of the disease every year, and is now endemic to more than 100 countries in Africa, the Americas, the Eastern Mediterranean, South-East Asia region, and the Western Pacific.

**What was the study about?**

According to the study, published in the journal Nature Microbiology, dengue patients with higher levels of iron in the blood, had lesser chances of infecting mosquitoes that draw their blood with the virus. The researchers led by Penghua Wang of the University of Connecticut in the US wanted to see if the quality of a dengue patient’s blood had an impact on the spread of the dengue virus.

They collected blood from healthy human volunteers and added the dengue virus to each sample.

When they fed the blood to mosquitoes and checked how many of the mosquitoes were infected from each batch, they found lots of variations.

**What did the study found out?**

Wang and his colleagues found that the variation was linked closely with the level of iron in the blood.

“But it could be possible that iron supplementation could reduce dengue transmission to mosquitoes in those areas,” Wang added.

The researchers also found similar results when using a mouse model. They found that anemic mice were more likely to transmit the virus to mosquitoes that fed on their blood. The team noted that this was due to the immune systems of the mosquitoes.

The researchers found that the gut cells of mosquitoes take up iron from their blood feed, and use it to produce reactive oxygen, which kills the dengue virus.

People with low iron levels in the blood are more likely to spread the deadly dengue virus.

**Important findings**

Wang explained that dengue was prevalent in areas where iron deficiency was also more common. However, he added that it doesn’t necessarily explain the high prevalence of dengue in those areas.

“But it could be possible that iron supplementation could reduce dengue transmission to mosquitoes in those areas,” Wang added.

However, the researchers added that there was a caveat. They cautioned that malaria -- caused by the plasmodium parasite -- was common in the same areas as dengue, but the malarial parasite thrived in iron-rich environments.

Wang and his team added that malaria may become more prevalent in such areas if everyone is supplementing with iron. They cautioned that public health authorities must weigh the costs and benefits before initiating population-wide iron supplementation programmes.
he science of extending life is a subject of morbid fascination, conjuring the image of old billionaires being cryogenically frozen. But imagine if, instead of a pill you could take to live for ever, there was a pill that could push back the ageing process – a medicine that could stave off the fragility, osteoarthritis, memory loss, macular degeneration and cancers that plague old age.

It could happen, with the science of senolytics: an emerging – and highly anticipated – area of anti-ageing medicine. Many of the world’s top gerontologists have already demonstrated the possibilities in animals and are now beginning human clinical trials, with promising results. If the studies continue to be as successful as hoped, those who are currently middle-aged could become the first generation of oldies who are youthful for longer – with a little medical help.

Most scientists studying longevity are more concerned with prolonging what they call “healthspan” than they are lifespan: that is to say, helping people to age with less pain and illness, with a better quality of life. Not only would this be good for old people, but in these times of booming elderly populations worldwide, it would be great for economies.

In England and Wales, life expectancy has risen by almost 25 years in the past century; the Office for National Statistics predicts that the UK’s population of over-65-year-olds will grow by 8.6 million (about the population of London) over the coming 50 years. This will be expensive: the NHS spends more than twice as much on 65-year-olds as it does on 30-year-olds; 85-year-olds cost more than five times as much.

“Healthy ageing is a huge project – it can come with a lot of benefits, both for governments and older patients themselves,” says Ming Xu, an assistant professor at the University of Connecticut’s Center on Ageing. Ageing, as Xu notes, is the biggest risk factor for most chronic diseases; the goal of his lab is to unearth novel interventions to slow down the ageing process and simultaneously prevent the diseases.

Xu is at work on senolytics, a branch of medicine that targets senescent cells; the various faulty cells that have been
identified as instrumental in our eventual demise. These so-called “zombie” cells linger and proliferate as we age, emitting substances that cause inflammation and turn other healthy cells senescent, ultimately leading to tissue damage throughout the body.

Xu was part of a team at the Mayo Clinic, an academic medical centre in Minnesota, that showed in 2011 that “using a genetic trick to get rid of these senescent cells can significantly improve health and lifespan” in prematurely aged mice. In 2016, the same group achieved similar results in naturally aged mice, releasing an arresting image of two elderly rodents born of the same litter. The one cleared of its senolytic cells seems spry and glossy, while its sibling is shrunken, greying and looks its age.

The picture alone helped bring in millions from investors including Jeff Bezos and PayPal co-founder Peter Thiel, who saw the promise of replicating the same results in humans. Kevin Perrott, president of the Washington DC-based Global Healthspan Policy Institute, said in 2018 that the response showed that Silicon Valley tended to view ageing as a problem that could be solved “with enough time and enough steps”: “The size of the return is huge. If you’re able to bring anything like that to the market, you have something that’s universally needed.”

However, the “genetic trick” used to destroy senescent cells in the mouse studies was not viable as a safe treatment for people, so a new company, called Unity Biotech, was formed to raise funds to develop medicine that could safely clear zombie cells from the human body.

The first hurdle – for them, and the other scientists investigating the unknown intricacies of senolytics – was identifying what, exactly, they were trying to treat. In order for a drug to be approved, it has to be shown to be effective in treating a disease; but ageing is a natural built-in process, and, far from a localised problem, it involves complex systemic degradation.

Trials in senolytics are initially targeting specific conditions such as age-related macular degeneration, glaucoma and chronic obstructive pulmonary disease (which includes emphysema). Most are in the fledgling stages, working on rodents or human tissue in petri dishes, although in February a small early human trial showed an improvement in the distance patients were able to walk.

Also this year, a pre-clinical pilot trial for injecting a senolytic drug into the knees of people with osteoarthritis showed promising, if mixed results. In the first part of the study, where patients received varying doses of the drug, significant improvements in pain and function were observed, whereas the second experiment, in which patients received the maximum dose, didn’t see significant benefits. It is hoped that, eventually, there will be a number of senolytic drugs that could potentially target different senescent cell types, but currently much of the research has involved a combination of a leukaemia drug called dasatinib and quercetin, a polyphenol common in plants.

This is an extremely new field of research. “That’s why there’s so much interest,” says Sebastian Grönke at the Max-Planck Institute for Biology of Ageing in Cologne. Senolytics are particularly exciting, he says, because “they seem to still work very late in life” ... “So it will be possible to study more quickly whether they actually work in humans, and they are applicable to people already at the end of their lives.”

Xu says that, in theory at least, it should prove impossible to build up a resistance to the drugs, “because senescent cells cannot proliferate”. Even more importantly, he says, there is significant
data to show “that you don’t have to treat these patients every single day. You just treat them once a week or once a month … intermittent treatment is more than enough to have huge benefits.”

Senolytic drugs may also be able to play a part in other conditions. Xu has found that obesity can cause senescent cells to develop prematurely. “We also found that clearing senescent cells improves insulin sensitivity. So senolytic drugs not only work on ageing but also on obesity … Senescence is a connection between these two very common conditions.” While treating obese mice with senolytics, Xu observed that their anxiety levels reduced, too.

These aren’t the only potential added benefits. Grönke says that senescent cells “play a big role after cancer treatment”, developing as a result of chemotherapy and radiation therapy. “If senolytics can be used to help eliminate the damaged cells before they can spread, a detrimental side-effect of cancer treatment could be alleviated.”

Xu usually administers senolytics to mice at their equivalent of 70 to 80 years old in humans. “You don’t want to take it when you’re young, which would have zero effect, or harmful effects – but you don’t want to leave it too late. When to start giving the drug is a huge project and a huge question for us to answer over the next several decades.” He expects the ideal treatment age will differ from person to person, and that ultimately scientists will develop a blood or urine test that can assess the level of senescence present. “Some people age very fast, and some age very slow, so it could vary a lot,” he says.

So what can anyone determined to hold off the debilitating effects of age do while we await the wonder drugs? Intermittent fasting may have senescent effects. Grönke says caloric restriction, whereby “people eat less in general”, has been linked to healthy ageing and longevity. Mouse trials have shown that they can live 30 to 50% longer than control animals able to eat as much as they want. “It’s also well known that these animals have less senescent cells at comparable ages.” There is also a diet, developed by the gerontologist Valter Longo at the University of Southern California, that mimics the effects of fasting for those too frail to skip meals.

Of course, the risks of disease that increase with ageing are heightened by sedentary living, alcoholism and bad diet. Grönke recommends, along with a healthy diet, “reducing the amount of animal protein you consume – you can eat meat but ideally maybe once per week, maximum.” He says an association between low protein intake and longevity is well established in humans. “Ideally the protein should come from vegetables and not from meat.”

Just as obesity has been shown to increase the burden of senescent cells in tissue, exercise can reduce it, says Xu. But the effects were recorded in obese mice that had undergone a lot of vigorous exercise: “I don’t think the aged population is able to take intense exercise like that.”

So some signs are promising, and the potential is huge, but much still remains unknown about senolytics for ageing. There are clinical trials in the pipeline, with drugs for osteoarthritis leading the way, but an effective pill accessible to all is certainly not imminent. Xu puts it at five to 12 years away: “Theoretically I’m confident.” Those looking to live for ever might be wise to book that cryogenics appointment, just in case. ●
THE ALLURE OF MONKEYFLOWERS

A tough, diverse, colorful weed used in evolutionary studies is becoming a key model for plant biology.

By Elizabeth Pennisi

Yaowu Yuan’s passion for monkeyflowers began in 2004 with a slideshow. Then a budding plant taxonomist at the University of Washington in Seattle and an avid hiker, he was amazed at the variety of wildflowers he saw on his outings in the Cascade mountains. Like Charles Darwin, he was vexed by what Darwin called an abominable mystery: How did nature generate such a diversity of flower colors and forms? During a campus seminar, Yuan encountered a plant that he thought might yield answers. University of Washington plant molecular biologist H. D. “Toby” Bradshaw and his graduate student showed slides documenting as much floral diversity within a single monkeyflower species as Yuan had seen in the meadows and streambanks of the Cascades—all generated by mutating the genome of this one Mimulus species.

The revelation changed the course of Yuan’s research because he realized such mutants could lead to a better understanding of flower development in all plants. Since starting a faculty job at the University of Connecticut (UConn) in Storrs 6 years ago, he has been tracking down genes that control color, shape, size, and other traits in Mimulus flowers—and that may have similar effects in other plants. And he is far from the only scientist to have fallen under the spell of a plant best known as a weed that thrives where few plants, even other weeds, can grow—around abandoned copper mines and hot springs and in other inhospitable, mineral-laden soil.

Like plant scientists’ traditional lab workhorse, the mustard weed Arabidopsis thaliana, monkeyflowers grow fast, produce a lot of seeds, and have a simple genome—appealing traits for lab studies. But their explosion of flower colors and forms, diverse lifestyles, and extraordinary hardiness—dramatic contrasts to the unassuming Arabidopsis—have seduced researchers studying plant evolution and adaptations. “You can use Mimulus to study traits that don’t even exist in Arabidopsis,” Yuan says.

More than 40 labs now focus on select members of Mimulus, a number that has doubled in the past decade, says Andrea Sweigart, an evolutionary geneticist at the University of Georgia in Athens. The National Science Foundation (NSF) has funded both individual evolution and ecology projects with Mimulus and, more recently, supported a $1 million effort to develop efficient techniques for altering traits in those plants.
“A large, organized, and growing research community is using this system,” says evolutionary geneticist Theodore Morgan, a program officer at NSF in Alexandria, Virginia. A monkeyflower meeting in Providence in June drew about 70 biologists, more than triple the number who attended the first one 13 years ago. The number of publications on *Mimulus* still isn’t huge—about 425—but that tally has grown rapidly in the past decade.

Some researchers are exploring monkeyflowers’ own unusual adaptations. But other scientists are turning the flowers into a window on widespread biological processes. Yuan, for example, recently teamed up with another lab to use *Mimulus* mutants with odd petal color patterns to provide the most detailed example yet of mathematician Alan Turing’s scenario for how zebra stripes, leopard spots, and some floral patterns arise in nature. Another team examining how monkeyflowers mutate as they grow revealed a mechanism that may enable many plants evolve faster than animals.

The field may even have its first serious controversy: Some researchers are rejecting a recent revision of the monkeyflower family tree that split the more than 100 *Mimulus* species into multiple genera, creating confusion in the scientific literature by renaming the most studied monkeyflower species. The researchers’ passion is a measure of the enthusiasm the new model plant arouses. One opponent of the new tree, John Willis, an evolutionary geneticist at Duke University in Durham, North Carolina, says flatly, “We’re not going to take it anymore.”

**LAB SCIENTISTS AREN’T THE FIRST** to be fascinated by *Mimulus*, which is found worldwide, often in the harshest spots, such as the bare islands of “serpentine” soil that dot the forests of California’s Sierra Nevada mountains. Plant ecologists have conducted field studies of wild *Mimulus* for 80 years. Last year, for example, researchers documented populations of *Mimulus guttatus* that contain a mix of individuals with different flowering times, flower sizes, and number of seeds produced. The late-flowering plants do better in wet years, and early-flowering ones do better in years when drought hits early in the season. Because the amount of rain varies from year to year, the two variants coexist in a population, although the proportions change over time. The work, reported last year in *Science* (3 August 2018, p. 475), provided long-sought proof of an evolutionary phenomenon called fluctuating selection, in which changing conditions cause a species to evolve in multiple directions. Theorists have proposed that fluctuating selection helps explain the extensive variation seen in many other species besides monkeyflowers.

At the June *Mimulus* meeting, Willis revealed a major clue to another monkeyflower mystery: the plants’ affinity for serpentine soils. Because they derive from Earth mantle rock, those soils are rich in iron and magnesium but low in potassium and calcium, which plants depend on to maintain their cell walls. The soils also tend to have little nitrogen, vital for plants, but plenty of toxic heavy metals, such as nickel and chromium.

Willis and his Duke postdoc Jessica Selby recently crossed serpentine-tolerant monkeyflowers with versions of the plant that were not growing on serpentine soil. The duo tested several generations to identify DNA important to the trait. To narrow the hunt for relevant genes, Selby collected *M. guttatus* specimens from serpentine soils in seven places across California and Oregon and compared their DNA with that of populations of *M.*
guttatus living nearby, on richer soil.

Both approaches pointed to a gene for an enzyme that makes arabinose, a sugar found primarily in the plant cell wall, Willis reported. That gene varies among M. guttatus plants, but every plant that can grow on serpentine soils has the same mutation. It may alter how arabinose interacts with other components of the cell wall, somehow compensating for the low calcium and high magnesium and keeping cell walls intact—an idea Willis’s team is testing with researchers from the University of California (UC), Berkeley, and Stanford University.

By harnessing population genetics and other gene-finding techniques, Willis “was way ahead of the curve in seeing how genomics could make the tremendous natural variation in plants knowable at the level of the gene,” says Lila Fishman, an evolutionary biologist at the University of Montana in Missoula. The work could have practical benefits as well, adds Benjamin Blackman, an evolutionary biologist at UC Berkeley: “Learning how plants have already adapted to cope with marginal soil environments can inform breeding efforts aimed at developing crops that can cope with poor soil.”

Besides probing monkeyflowers’ own special biology, researchers are using them to glean more general lessons about plants and animals. Take Yuan and Blackman’s work on color patterning. Blackman’s lab originally studied sunflowers. But M. guttatus appealed to him for studies of the genetic basis of patterning because its simple genome had been sequenced—making it easier to test the role of particular genes and proteins by genetically modifying the plant. Independently, he and Yuan homed in on the same protein, which they thought might be a key to flower color patterns.

Yuan and UConn postdoc Baoqing Ding had recently tracked down the gene that causes red pigment to appear on the yellow lower petal of some *Mimulus* flowers. The red usually appears as a band of speckles, which serve as a “nectar guide” for incoming pollinators. Many types of coloration in plants and animals are the result of a network of proteins that activate pigment genes at specific places and times in the body. But Yuan and Blackman wondered whether the monkeyflower spots might be generated instead through a patterning mechanism proposed in the 1950s by Turing, who is best known for breaking the Germans’ Enigma code in World War II but was also a theoretical biologist.

Turing predicted that some patterns emerge from the natural diffusion and interactions of proteins whose concentrations regulate each other’s production. For spots, when the gene encoding a cell’s “activator” of pigment production turns on, the activator protein stimulates its own production and that of a “repressor” protein, which diffuses beyond the pigmented spot. That second molecule shuts down any activator in the surrounding cells—causing a white halo. But the repressor gets more dilute the farther it travels, eventually losing its effect. Then the activator can turn on, and a new spot of color can form. Color patterns emerge depending on the differences in the two proteins’ diffusion rates.

Biologists have long assumed that Turing’s mechanism is responsible for zebra stripes and leopard spots and perhaps even for monkeyflower nectar guides. Indeed, Yuan had identified a monkeyflower protein that might serve as the activator. But no one had identified a full activator-repressor system involved in periodic pigmentation patterns.

Blackman, however, had noticed a clue
in some wild M. guttatus: They either lacked spots or else had just one large red patch, which he called a tongue, suggesting part of the system was missing. Independently, Yuan uncovered a similar red tongue variety among mutants he made in another Mimulus species. When they learned of each other’s work, the two joined forces. And at the June Mimulus meeting, they reported using the red tongue varieties to track down a protein dubbed R3-MYB, the repressor counterpart to the already known activator protein.

To confirm that R3-MYB really acted as a repressor, Yuan and Blackman both wielded molecular tools to block its production. Yuan relied on RNA interference, whereas Blackman’s team enlisted CRISPR—the first use of the genome-editing technology in Mimulus. Both techniques led to full red tongues on the plants’ petals, Blackman reported—vivid testimony that the mechanism Turing hypothesized can account for some of nature’s tapestry. “This work shows how Mimulus can provide broad insight into processes that shape biodiversity,” Sweigart says.

ANOTHER LINE OF WORK with monkeyflowers sheds light on biodiversity by revealing a mechanism, unique to plants, for rapidly adapting to new conditions. Their advantage, graduate student Jaime Schwoch of Portland State University in Oregon found, is rooted in the way they produce reproductive cells. In animals, the cells that mature into eggs and sperm are sequestered early in development, and they don’t divide until the organism sexually matures. That protects them from division-related mutations that occur in the organism’s nongerm, or somatic, tissues. But flowers, which contain both kinds of germ cells—pollen and ova—form from active somatic tissue at the tips of growing stems. Any mutations occurring in the dividing cells of a stem will be locked into the germ cells and can pass on to the next generation.

Given that somatic tissue mutations should accumulate in a plant’s germ cells over successive generations, Schwoch wondered why plants don’t wind up with many more such mutations than animals—and a greater burden of harmful ones. In fact, as the somatic parts of both plants and animals grow, their cells accumulate about one mutation per million bases per cell division, so plant germ cells should have far more mutations than animal germ cells. But they don’t. And deleterious mutations are surprisingly scarce in plants, Schwoch found when she compared two sets of monkeyflowers. She produced one by self-fertilizing Mimulus flowers with each flower’s own pollen, the other by fertilizing flowers with pollen from flowers on another stem of the same plant. The latter is the equivalent of a cross between different parents, because each stem acquires a unique set of mutations as it grows.

Self-fertilization, like inbreeding in animals, should pair up harmful recessive mutations, so Schwoch expected the crosses that used pollen from one stem on flowers from another to do better. But some of the more prolific, healthier plants came from progeny derived from a single stem, she reported at the Evolution 2019 meeting, also in Providence in June. That finding suggested the plants were somehow eliminating harmful mutations in their somatic cells and accumulating beneficial ones for their reproductive cells.

To verify that sorting process, Schwoch grew Mimulus plants for 6 months in saltier-than-normal conditions and then sequenced DNA from their tips, taking note of new mutations and how often the mutations appeared in the sequenced
material. Such mutations should occur in low frequencies, so when she found one that occurred in many cells of the plant tip, she inferred that the original cell with that mutation had grown much faster than cells without it and replaced them.

The rate of mutations doubled under the salt stress, she reported. Moreover, cells carrying mutations that improve salt tolerance proved more likely to persist in stems, whereas less well-adapted cells died out. The survivors made it into the germ line, so the within-lifetime innovations were passed on to subsequent flowers and pollen. The process means “plants can adapt very quickly” to tough situations, Schwoch said.

Duke evolutionary biologist Jennifer Coughlan is impressed. “This work has broad significance for all plants, but in particular for long-lived perennial plants, [which] accumulate many mutations across their lifetimes,” she says. Sweigart predicts that Schwoch will quickly unearth the specific mutations that produced the salt tolerance: *Mimulus* “has great genetic and genomic resources, so it should be possible to identify the precise molecular changes that have occurred” in her salt-tolerant plants, Sweigart says. And the lessons from monkeyflowers may point to ways to make other plants, including crops, more tolerant of salty soils, researchers suggest.

**JUST WHEN INVESTIGATORS** are flocking to monkeyflowers, the monkeyflowers may be scattering—at least taxonomically. A 2012 evaluation of the *Mimulus* family tree placed some of the better-studied monkeyflower species in other genera. For example, the popular *M. guttatus* is now named *Erythranthe guttata*. The *Mimulus* genus itself kept only seven species of the original 165-plus. Adopting new designations for many *Mimulus* species will lead to chaos in the scientific literature, some researchers in the field say.

Among monkeyflower researchers, the reclassification provoked a minor rebellion. Most did not use the new names in their presentations at the *Mimulus* conference or the subsequent Evolution meeting. A paper in press in the journal *Taxon* argues for a different, less disruptive reclassification, and Willis says that makes sense. “You either rename 150 species, or you rename 20 somewhat obscure species and call them all *Mimulus*,” he notes.

*A Mimulus* by any other name might smell as sweet, but most biologists don’t want to monkey around with their new favorite plant. ●
Satellites watch many things as they orbit the Earth: hurricanes brewing in the Caribbean, tropical forests burning in the Amazon, even North Korean soldiers building missile launchers. But some researchers have found a new way to use satellites to figure out what penguins eat: by capturing images of the animal’s poop deposits across Antarctica.

A group of scientists studying Adélie penguins and climate change have found that the color of penguin droppings indicates whether the animals ate shrimp-like krill (reddish orange) or silverfish (blue). The distinction is interesting because the penguin’s diet serves as an indicator of the response of the marine ecosystem to climate change. Separate research is starting to show, for example, that penguin chicks that are forced to rely on krill as their main source of food don’t grow as much as those who have fish in their diet.

The penguins’ guano deposits build up over time on the rocky outcroppings where the birds congregate, making them colorful landmarks. The researchers took samples from the penguin colonies, found their spectral wavelength, then matched this color to images taken from the orbiting Landsat-7 satellite.

“There's a clear regional difference: krill on the west, fish on the east,” says Casey Youngflesh, a postdoctoral researcher at the University of Connecticut who presented his findings last week at the annual meeting of the American Geophysical Union in Washington. It’s the first time scientists have been able to track diet from space, and researchers say it’s a new tool for looking at how certain seabird and penguin populations are doing on other regions of the planet.

Knowing what, and how much, 5 million breeding pairs of Adélie penguins are eating is important because it tells researchers how the base of the food chain is doing. The population of tiny krill appears to be crashing on the western side of the Antarctic peninsula, the 800-mile thumb that sticks up toward the tip of South America. Rapidly warming, changing climactic conditions, as well as a huge increase in industrial-scale fishing, have taken a toll on these small crustaceans.

Krill are harvested commercially for use in pet food and nutritional supplements, but for many penguins, they’re the

Eric Niiler
basis of their diet. As krill have become more scarce, so too have the penguins in western Antarctica who like to eat them. "Diet can tell us how food webs are shifting over time," says Youngflesh. "It would take a lot of time and a lot of money to visit all these sites. Climate change is extremely complicated, and we need data on large scales."

Youngflesh says he hopes the color-coded poop maps can be used to track penguin populations in the future, as well as other seabirds across the globe. That's because seabirds aggregate in the same places as penguins and eat the same things. Of course, this form of remote sensing can't tell researchers how penguins' diets compare across time. So one researcher dug through the guano itself in search of insights into the penguins' history.

"There are unanswered questions about when did they arrive, how have their diets changed over time," says Michael Polito, an assistant professor of oceanography and coastal sciences at Louisiana State University. "Those are questions satellites can't answer, and it was my job to dig it up."

Polito excavated mounds of guano, feathers, bones, and eggshells on the remote Danger Islands, a large penguin colony on the tip of the Antarctic Peninsula that has remained mostly free of human visitors. When he reached the bottom of the pile, he took the material back to his lab and applied radiocarbon techniques to figure out the age of the first penguin settlers. He found that the penguins have been living on Danger Islands for nearly 3,000 years. Since Adélie penguins need access to ice-free land, open water, and a plentiful food supply to feed their baby chicks, the presence or absence of a penguin colony is a sign of the climate conditions at the time, Polito says. Polito's new study pushes back the time of penguins' arrival there by 2,200 years for that region, and confirms other data taken from ice cores and sediments about the history of that region's climate.

"This ability to estimate penguin diets from space will be a real game changer for science in Antarctica," Polito said. "It really takes a lot of time and effort to figure out what penguins eat using traditional methods, so being able to evaluate diets all around the Antarctic continent from space is a pretty amazing leap forward."

The combination of digging through poop and analyzing images from satellites is giving researchers a better handle on possible trouble spots for the Adélie penguin, as well as its cousins the chinstrap, Gentoo, and emperor penguins. The laboratory of Heather Lynch, an associate professor of ecology and evolution at Stony Brook University, put together a nifty continent-wide map of penguin colonies from the four species, and is using citizen volunteers to count them one by one. Lynch's group is also beginning to look back at previous satellite images taken from the 1980s until now to see if they can establish the same penguin poop-diet connection.

This article was originally published on Wired by Eric Niller.
UCONN STUDENTS DEVELOP DEVICE TO HELP KEEP NAVY SAILORS FROM GETTING INJURED

We didn’t believe it either.

By Julia Bergman - The Day

Say you’re a ship captain and you want to know when one of your sailors is fatigued to the point he or she is at risk of getting injured.

Some University of Connecticut students have an idea.

The team of Devon Thompson, Julia Podsen, Yannis Halkiadakis, Prateek Rana and Kyle-Gabriel de Vera Tan, has developed a device, worn around the ankle, that detects normal and abnormal walking patterns. The goal is to develop an algorithm that can predict from someone’s walking patterns if they’re going to get injured and what the injury will be.

“The whole idea is, ‘Can we keep these people mission-ready? Can we keep them performing optimally on a boat?’” said Kristin Morgan, an assistant professor in UConn’s Biomedical Engineering Department.

The sponsor for the project is Electric Boat, which along with the Navy has made a big push to use wearable technology, given its low cost and ease of use, to monitor human performance.

A year and a half ago, UConn and the University of Rhode Island teamed up to create the Naval Science and Technology Program to get students interested in naval projects before they graduate, and to help create a pipeline of workers for the naval industries in the two states. More than 100 students have been involved in the program since it started.

Graduating engineering majors at both universities have to complete a senior project — that amounts to about 500 projects total between both universities. This year, 17 of the projects have naval relevance. The goal is to increase that number next year, and include some of the smaller suppliers of the naval industry in both states.

The wearable device project at UConn is just one example of what the students have been working on. As part of the project, the students have observed different subjects — some who are healthy, others who have lower-extremity injuries — going through the same walking protocol on a split-belt treadmill, which allows them to move their feet at different speeds. That destabilizes the subjects to see if they
can restabilize. They also observed them at symmetrical speeds.

The subjects wear the sensors around each of their ankles. The sensors have a small microphone attached, which capture the vibrations of their footsteps, which are then used to differentiate between abnormal and normal walking patterns.

The sensors also have a Bluetooth device attached, allowing them to collect the data in real time, which is plotted on a graph on a computer. The next step is to put the data into an algorithm that can be used as an early diagnostic tool to know if someone is susceptible to injury.

The students said there’s a myriad of uses for the tool such as sports rehabilitation. If you can predict when someone is going to get injured, and the type of injury, you could give them exercises for example to help prevent that from happening.

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**BUSINESS INSIDER**

**NASA SELECTS TWO NEW SPACE TECH RESEARCH INSTITUTES FOR SMART HABITATS**

**By PR Newswire**

As exploration missions venture beyond low-Earth orbit and to the Moon — and eventually Mars — NASA must consider automated technologies to keep habitats operational even when they are not occupied by astronauts. To help achieve this, NASA has selected two new Space Technology Research Institutes (STRIs) to advance space habitat designs using resilient and autonomous systems.

The selected proposals create two multi-disciplinary, university-led research institutes to develop technologies critical to a sustainable human presence on the Moon and Mars. The smart habitat, or SmartHab, research will complement other NASA projects to help mature the mission architecture needed to meet challenging exploration goals.

*This article was published on April 8, 2019.*
“Partnering with universities lets us tap into new expertise, foster innovative ideas, as well as expand the research and development talent base for both aerospace and broader applications,” said Jim Reuter, acting associate administrator of NASA’s Space Technology Mission Directorate. “We’re excited to work with these two new STRIs to develop smart habitat technologies for exploration missions on the Moon and Mars.”

Each STRI will receive as much as $15 million over a five-year period. The selected institutes are:

**Habits Optimized for Missions of Exploration (HOME)**

The HOME institute’s design approach for deep space habitats is one that relies not only on proven engineering and risk analysis, but also on emergent technologies to enable resilient, autonomous and self-maintained habitats for human explorers.

The institute seeks to advance early-stage technologies related to autonomous systems, human and automation teaming, data science, machine learning, robotic maintenance, onboard manufacturing, and more.

The HOME team is led by Stephen Robinson, principal investigator at the University of California, Davis, in partnership with the University of Colorado Boulder, Carnegie Mellon University, the Georgia Institute of Technology, Howard University, Texas A&M University and the University of Southern California. Industry collaborators include Sierra Nevada Corporation, Blue Origin and United Technology Aerospace Systems.

**Resilient ExtraTerrestrial Habitats institute (RETHi)**

RETHi seeks to design and operate resilient deep space habitats that can adapt, absorb and rapidly recover from expected and unexpected disruptions. The institute plans to leverage expertise in civil infrastructure with advanced technology fields such as modular and autonomous robotics and hybrid simulation.

Through an integrated effort, RETHi will mature deep space habitats that can operate in both crewed and uncrewed configurations. The institute plans to create a cyber-physical prototype testbed of physical and virtual models to develop, deploy and validate different capabilities.

The multidisciplinary team is led by Purdue University principal investigator Shirley Dyke, in partnership with University of Connecticut, Harvard University and the University of Texas at San Antonio.

The new selections will join two institutes founded by NASA in 2017. The established STRIs have advanced biological engineering and cutting-edge methods for developing carbon nanotube-based, ultra-strong and lightweight aerospace structural material.

The two inaugural institutes are the Center for the Utilization of Biological Engineering in Space (CUBES) and the Ultra-Strong Composites by Computational Design (US-COMP). Both of these undertakings are harnessing a talent base of inventiveness and innovation to help shape NASA’s pursuit of Earth-independent, self-sustaining exploration mission capabilities.

These selections are funded by NASA’s Space Technology Mission Directorate (STMD), which is responsible for developing the cross-cutting, pioneering, new technologies and capabilities needed by the agency to achieve its current and future missions.
KEY PARTS OF A FRUIT FLY’S GENETIC MAKEUP HAVE FINALLY BEEN DECODED

Jumping genes in chromosomes may ensure DNA gets where it needs to go when cells divide

By Tina Hesman Saey

Some of the most important chapters in fruit flies’ genetic instruction book have finally been decoded.

For the first time, researchers have deciphered, or sequenced, the genetic makeup of all of a multicellular organism’s centromeres — and discovered stretches of DNA that may be key in divvying up chromosomes. Errors in doing that job can lead to cancer, birth defects or death. The team reported the achievement May 14 in PLOS Biology.

Centromeres, which give most chromosomes their characteristic X shape, help move chromosomes in dividing cells. “The chromosome is a bus, and our DNA and genes are the passengers. The centromere is the bus driver,” says Beth Sullivan, a geneticist and centromere biologist at Duke University School of Medicine not involved in the study. “It’s what moves the chromosome, after the DNA has been copied, into new daughter cells.”

Until now, scientists have known very little about these genetic bus drivers. Some centromeres from corn, horses, yeast and other fungi — and one human one that drives the Y chromosome — have been characterized. But mostly what scientists knew about centromeres is that they are incredibly long stretches of repetitive DNA.

Although scientists reported in 2000 that they’d finished reading the entire Drosophila melanogaster instruction book, or genome, in truth, researchers had skipped over the flies’ centromeres and other repetitive DNA. (The human genome is also not really complete; human centromeres, except for that of the Y chromosome, are still mysteries.)

The reason for the oversight was technical: To sequence the genome — meaning determine the order of DNA’s chemical letters, known as bases — scientists first had to chop the DNA into tiny pieces about 150 bases long. Computers can put the genome together by finding where two pieces match up. Centromeres tend to repeat the same letters over and over again and can stretch for millions of bases, so many of the small bits look alike. “It’s like trying to put together a jigsaw puzzle of a blue sky when all the puzzle pieces look the same,” says Amanda Larracuente, an
evolutionary geneticist at the University of Rochester in New York.

Larracuente and colleagues used new technology to sequence stretches of DNA 10,000 to 100,000 bases long. “It’s like having much bigger puzzle pieces,” Larracuente says, “So now we might be able to catch a wisp of a cloud in our blue-sky puzzle pieces, and that makes it a lot easier to figure out how these pieces of DNA fit together.” The team also used several other techniques to fit their centromere puzzles together.

Those techniques should make it possible for other scientists to fill in gaps in other organisms’ genomes, says Gernot Presting, a centromere biologist at the University of Hawaii at Manoa not involved in the study.

When the team finally finished putting the centromere pieces together, it found stretches of repetitive DNA interspersed with “islands” of jumping genes. These jumping genes, or retrotransposons, are ancient mobile pieces of DNA akin to viruses that can copy themselves and insert those copies in spots throughout the genome. Sometimes that jumping causes harm, such as when a retrotransposon lands in and breaks an important gene. But transposons also have shaped human evolution (SN: 5/27/17, p. 22).

Each fruit fly chromosome’s centromere is unique, although all have the same basic structure of retrotransposon islands — particularly the retrotransposon G2/Jockey-3 — surrounded by seas of repetitive DNA. Copies of G2/Jockey-3 are scattered in other places in the fruit fly genome, but about 63 percent of its copies are in centromeres, the researchers found. Those results might mean that the transposon is a seed around which new centromeres can form, or the transposon may just hop into centromeres more often than into other parts of the genome.

The researchers uncovered one clue hinting that G2/Jockey-3 might seed centromeres: A key centromere protein called CENP-A clings to those transposon islands. That protein helps secure the centromere to the cellular machinery that separates chromosomes into new daughter cells. Finding that CENP-A sticks to the transposon islands suggests the jumping genes might be in the centromere’s driver’s seat.

Centromeres in plants, fungi, bats, gibbons and humans also contain retrotransposons. But no one really knows whether those transposons are driving the bus or are just along for the ride, says coauthor Barbara Mellone, a geneticist at the University of Connecticut in Storrs. Presting, for example, argues that there’s evidence that transposons are passengers: In corn, centromeres move first and retrotransposons hop aboard later. Armed with centromeres’ structure, Mellone and colleagues hope to find out exactly how important the jumping genes are to keeping fruit fly centromeres and their chromosomes on the right track. ●
A NEW CULPRIT FOR MULTIPLE SCLEROSIS RELAPSES

We didn’t believe it either.

NEUROSCIENCE NEWS

Summary: Injecting extracellular vesicles from healthy mice into mice that had an MS-like disease resulted in the development of a relapse-remitting disease and active CD8+ cells, similar to that seen in human patients with multiple sclerosis. Examining the EVs in mice and humans with MS, researchers identified they contained fibrinogen, a protein normally associated with blood clotting and wound healing. According to researchers, the EVs with fibrinogen appear to activate the CD8+ immune cells. The findings could help with the development of new treatments for RRMS. Source: University of Connecticut

A molecule that helps blood clot may also play a role in multiple sclerosis relapses, researchers report in the May 6 issue of PNAS. The new research may help answer the mystery of why remissions happen, as well as find early markers of the disease.

But the damage isn’t permanent, at least not at first. Most people with multiple sclerosis have recurring episodes of disability, followed by remissions when their symptoms lessen or disappear. Why these relapses and remissions happen is a great mystery. We know that the damage to the nerves is caused by the immune system, the army of cells in our body that is supposed to protect us from disease-causing invaders. For some reason, in MS, the immune system turns on cells in the brain and spinal cord. In MS patients, a particular type of immune cell – CD8+ cells, a part of the immune system that normally kills cells that are cancerous or infected – seem to be the ones doing the damage.

Although researchers have been able to develop drugs to help fight MS using a mouse version of MS, these experimental mice develop a slightly different immune system response than what happens in MS in humans. Different cells do the damage in MS mice: CD4+ cells. The mice have CD8+ cells, but those CD8+ cells are
generally quiescent. This has been a big stumbling block to understanding how the immune system develops in MS.

But a team of researchers from UConn Health, the University of Illinois at Chicago (UIC), and the Gladstone Institutes have figured out how CD8+ cells are activated in MS mice, and the result seems very close to what happens in humans. The new findings hinge on how cells talk to each other. Cells will often secrete little bubbles containing proteins and genetic signals. These bubbles are called extracellular vesicles, or EVs. EVs are made by most cells in the body, and float in the blood stream like a message in a bottle.

So the team injected EVs from normal, healthy mice into mice that had that experimental MS-like disease. When they did this, the mice acquired a relapsing-remitting disease and active CD8+ cells, like human MS patients. The researchers examined the EVs in mice and patients with MS and found they contained fibrinogen, a protein that neuroscientist Katerina Akassoglou’s lab at Gladstone had been studying in MS. Fibrinogen normally helps blood clot and seal up wounds. But in these MS mice, the EVs with fibrinogen seemed to activate the CD8+ immune cells. When they injected the MS mice with EVs that did not have fibrinogen, they could not cause the relapsing-remitting illness.

“These findings expand our understanding of how fibrinogen contributes to the progression of MS pathology” says Akassoglou, senior investigator at Gladstone and professor of neurology at UC San Francisco.

“Fibrinogen in exosomes may have far-reaching implications for therapies and as a biomarker for disease progression in MS and potentially, other neurological diseases,” she says.

“We now have a robust model of relapsing/remitting disease driven by CD8+ cells,” says UConn neuroscientist Stephen Crocker, who directed the study. “There’s all these clinically important questions we can now ask.” Crocker and his colleagues want to study this model further to understand how and why the remissions of disease happen.

“Understanding the causes of relapses is a key step on the path to a cure for MS,” says study co-author Ernesto Bongarzone, an anatomy and cell biology neuroscientist and professor at UIC. “The results of this study and the identification of fibrinogen as a key molecule contributing to relapses are exciting steps forward.”

The researchers would like to understand how the fibrinogen stimulates the CD8+ cells that cause the relapsing and remitting disease activity. They would also like to test whether fibrinogen and related proteins found in the EVs also play a role in humans with MS, and test if these molecular signals in EVs might be early warnings of relapses or disease progression. ●
A new study published Monday in *BMC Medicine* finds that only about half of the clinical trials requested by the US Food and Drug Administration (FDA) as part of postmarketing commitments for newly approved drugs and biologics are published in peer-reviewed journals.

The study also found that information for nearly half of the postmarketing commitment studies subject to reporting requirements under section 506B of *Federal Food, Drug, and Cosmetic Act* (FDCA) was not up to date.

Conducted by researchers at Yale University, University of Connecticut and University of California, San Francisco, the study reviewed postmarketing commitments for the 110 new drugs and biologics approved from 2009-2012.

Unlike postmarketing requirements, which drugmakers must conduct as a condition of approval, postmarketing commitments are agreed to by drugmakers at the time of approval and are not required under statute or regulation.

More than half (55.5%) of the 110 approvals had one or more postmarketing commitment(s), with 33 requiring a new clinical trial. Of those, 27 were subject to Section 506B reporting requirements.

For the studies subject to reporting requirements, 12 (44.4%) were neither closed nor had an up-to-date status in publicly available databases on FDA’s website.

The study did find, however, that nearly all the clinical trials requested as part of postmarketing commitments were registered on ClinicalTrials.gov (90.3%), most of which were marked as completed or terminated (82.1%). Of the completed or terminated studies all but one had reported results.

However, the authors found that most of the studies (81.8%) that had reported results on ClinicalTrials.gov reported their results after the scheduled submission deadline.

Only about half of the studies that were eligible for publication (i.e. completed or terminated in ClinicalTrials.gov or submitted, fulfilled or released according to FDA) were published in peer-reviewed journals.

“Among the 29 registered or unregistered studies for which publication would be expected based...
on the most recent status provided by the FDA, pharmaceutical companies, or on ClinicalTrials.gov, just under half were published in a peer-reviewed journal (14 of 29 (48.3%)),” the authors write.

And while postmarketing commitments only make up 19% of the postapproval commitments and requirements imposed by FDA, the authors say the data generated by postmarketing commitments “may be a potentially important source of information about drug and biologic safety and effectiveness after market approval.”

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**Names Prompt Distinct Brain Activity in Preschoolers**

A study from Penn and CHOP found that when preschoolers with autism spectrum disorder hear their name, their neural patterns match those of their typically developing peers. The finding held regardless of whether the child’s mom or a stranger called the name.

Infants as young as 6 months old can typically recognize and respond to their own name. It’s an important skill for language development and social growth, one that children with autism spectrum disorder often struggle with.

A team from Penn and Children’s Hospital of Philadelphia (CHOP) wanted to understand what brain activity looks like when children from two groups—typically developing preschoolers and preschoolers with autism—hear their name.

As it turns out, children in both groups show a preference for their own name and exhibit neural patterns akin to those observed in adult brains that are experiencing similar stimuli. What’s more, this observation holds regardless of whether the child’s mom or a stranger is the one calling the name. The researchers published their findings in the journal *PLOS One*.

We expected we might see differences in the brain activity, because we know an early hallmark of autism spectrum disorder is a lack of behavioral response and orienting when someone calls their name,” says Leah Wang, a doctoral student in Penn’s Psychology.
Department, a researcher at CHOP’s Center for Autism Research, and co-first author of the paper. “It’s not completely absent, but we know there’s diminished frequency and consistency.”

Instead, she continues, the study found that the participants with autism and those in the typically developing group showed similar brain activity in response to their own names, indicating that children in both groups differentiated their names from other sounds. This finding suggests “there might be other processes we should look into contributing to this diminished behavioral responding,” she adds.

To get a picture of the brain activity prompted by this experience, Wang and colleagues, including University of Connecticut doctoral student and co-first author Rebecca Thomas, recruited 19 typically developing 3- to 5-year-olds and 13 with autism. The experiment, which included more than 1,000 trials, included four stimuli: mom calling the child’s name, mom calling a made-up name, or a stranger calling both names. The participants, the majority of whom were male, wore an electroencephalogram (EEG) cap during each trial.

“The sounds were all randomized,” explains Thomas. “They didn’t always hear mom calling their name first, for instance. The stimuli were all mixed up. Once we collected EEG data, we went through to pinpoint the brain signals that aligned with certain stimuli.” For example, what does the electrical signal look like when the mother says the name compared with the stranger? Does this look the same or different if the child has autism spectrum disorder?

Answering these questions matters because recognizing your name can act as an important social marker of attention. “It serves as an anchor for the rest of your social development,” Thomas says. “It helps you to identify when someone is talking to you and whether you should be paying attention. You can imagine that a child who is not consistently responding to his or her name might be missing out on interactions.”

In the future, the scientists would like the ability to assess sub-groups within the broader autism spectrum disorder population, which will require a much larger sample size than the current work. They’re also interested in studying younger populations and in changing their secondary stimuli to something more relevant to the child, like a word describing a favorite toy rather than a made-up name.

For now, the researchers say they hope the work will simply encourage additional interest in studying neural activity in children with autism. “We call it ‘preliminary’ because we want to get these results out there and get research going on this topic,” says Wang, who is also part of CHOP’s Center for Autism Research. “Our study is a really nice first step.”
NEW STUDY REVEALS MS MAY BE A ‘DISEASE OF AGING’

Researchers found abnormal aging of neural progenitor cells in progressive MS.

By Trevis Gleason

There are some words that just don’t mean what they sound like they should mean. “Senescence” is one such word. While it evokes a mashup of ethereal pleasure and a hair conditioner brand, it is a biological term for the process of deterioration due to aging.

Cellular senescence occurs naturally as we grow older, but it may also contribute to some neurodegenerative diseases, possibly including progressive forms of multiple sclerosis (MS).

That’s what Stephen Crocker, PhD, associate professor of neuroscience at the University of Connecticut School of Medicine in Farmington, found when he and fellow researchers studied neural progenitor cells (NPCs) within the brain matter of people with progressive MS.

They published their results in March 2019 in the journal Proceedings of the National Academy of Sciences.

In PPMS, Brain Stem Cells Age More Quickly

NPCs are sort of like stem cells that are predetermined and targeted to become specific types of brain cells.

Oligodendrocyte progenitor cells become oligodendrocytes, and oligodendrocytes produce myelin, the protective nerve coating that gets damaged in MS — or at least, they’re supposed to produce myelin.

Dr. Crocker’s team found that NPCs in the brain tissue around lesions of deceased patients with progressive MS showed chemical signs of unnatural “aging.”

By “aging,” the researchers were referring to telltale protein activity (or inactivity) in cells that inhibits the NPC from attaining their final stage of development, or properly producing myelin once they do mature.

It appears that oligodendrocytes, which are supposed to fix natural damage to the myelin sheath around nerves, as well as MS-related damage are, in MS patients, not acting their age. They’re acting like much older cells.

The research paper reports that compared with like-aged control patients without MS, those with primary-progressive MS expressed cellular senescence markers.

In a press release, Crocker is quoted as saying, “We know MS is not a disease
of the aged, but it may be a disease of aging.”

Treatment With Rapamycin Helped

This is, obviously, an important breakthrough in understanding the mechanism of MS progression. Often these breakthrough discoveries give us hope, but we have to wonder what will come of the practical applications of the research. In this case, however, there is already evidence that something might be done about the cellular senescence.

The researchers report that they were able to reverse the expression of cellular senescence in NPCs of PPMS progenitor cells by treating the cells with the drug Rapamune (rapamycin), also known as sirolimus, an immunosuppressive drug used to prevent rejection of transplanted organs.

There are also a small number of drugs that are being explored as anti-aging medication that may also prove useful in this flank of MS research.

And it’s possible this research into progressive MS may lead to benefit for relapsing forms of the disease, too. Only time will tell. We can only hope that our “aging” neural progenitor cells will stay “young” enough for us to see the outcomes of further research.

Wishing you and your family the best of health.

Cheers,

Trevis

COMPLEX SOCIETIES GAVE BIRTH TO BIG GODS, NOT THE OTHER WAY AROUND: STUDY

An international research team, including a member of the Complexity Science Hub Vienna, investigated the role of “big gods” in the rise of complex large-scale societies. Big gods are defined as moralizing deities who punish ethical transgressions. Contrary to prevailing theories, the team found that beliefs in big gods are a consequence, not a cause, of the evolution of complex societies. The results are published in the current issue of the journal Nature.
For their statistical analyses, the researchers used the Seshat Global History Databank, the most comprehensive collection of historical and prehistorical data. Currently, Seshat contains about 300,000 records on social complexity, religion and other characteristics of 500 past societies, spanning 10,000 years of human history.

“It has been a debate for centuries why humans, unlike other animals, cooperate in large groups of genetically unrelated individuals,” says Seshat director and co-author Peter Turchin from the University of Connecticut and the Complexity Science Hub Vienna. Factors such as agriculture, warfare, or religion have been proposed as main driving forces.

One prominent theory, the big or moralizing gods hypothesis, assumes that religious beliefs were key. According to this theory, people are more likely to cooperate fairly if they believe in gods who will punish them if they don’t. “To our surprise, our data strongly contradict this hypothesis,” says lead author Harvey Whitehouse. “In almost every world region for which we have data, moralizing gods tended to follow, not precede, increases in social complexity.” Even more so, standardized rituals tended on average to appear hundreds of years before gods who cared about human morality.

Such rituals create a collective identity and feelings of belonging that act as social glue, making people to behave more cooperatively. “Our results suggest that collective identities are more important to facilitate cooperation in societies than religious beliefs,” says Harvey Whitehouse.

**Big data: a new approach to social theories**

Until recently, it has been impossible to distinguish between cause and effect in social theories and history, as standardized quantitative data from throughout world history were missing. To address this problem, data and social scientist Peter Turchin, together with Harvey Whitehouse and Pieter François from the University of Oxford, founded Seshat in 2011. The multidisciplinary project integrates the expertise of historians, archaeologists, anthropologists, social scientists as well as data scientists into a state-of-the-art, open-access database. Dozens of experts throughout the world helped to assemble detailed data on social complexity and religious beliefs and practices from hundreds of independent political units (“polities”), beginning with Neolithic Anatolians (today Turkey) in 9600 BCE.

The complexity of a society can be estimated by social characteristics such as population, territory, and sophistication of government institutions and information systems. Religious data include the presence of beliefs in supernatural enforcement of reciprocity, fairness, and loyalty, and the frequency and standardization of religious rituals.

“Seshat allows researchers to analyze hundreds of variables relating to social complexity, religion, warfare, agriculture and other features of human culture and society that vary over time and space,” explains Pieter François. “Now that the database is ready for analysis, we are poised to test a long list of theories about human history.” This includes competing theories of how and why humans evolved to cooperate in large-scale societies of millions and more people.

“Seshat is an unprecedented collaboration between anthropologists, historians, archaeologists, mathematicians, computer scientists, and evolutionary scientists”, says Patrick Savage, corresponding author of the article. “It shows how big data can revolutionize the study of human history.”
Researchers Pim Edelaar at Pablo de Olavide University (Seville, Spain) and Daniel Bolnick at the University of Connecticut (U.S.) have developed a classification of the ways that species can improve their success in relation to their environment. This theoretical framework is a conceptual tool that helps to understand and contemplate the total range of options that an organism has to relate to its environment, recognizing all the processes that may be relevant in the real world (such as in biology, medicine, sociology and economics). “Many times, some processes are overlooked, but all are necessary to better understand what is happening or think of what could be done,” explains Pim Edelaar. The results have been published in Trends in Ecology and Evolution.

Individuals and populations can increase their success through a wide variety of options to relate to the environment. All these options can be classified according to two characteristics: What aspect is changing (the organism or its environment?), and how this change occurs (through a process of adjustment or of selection?), thus offering four combinations that together form a square.

The classification is valid for any ecological context, including interactions with other individuals and sexual partners. Therefore, it has potential application in any field of research involving organisms, including economic and social sciences.

Dr. Edelaar presents an example of application to daily life: “How can we improve the performance of our children at school? What options do we have?” He uses this theoretical framework to group the possibilities into four processes: “On the one hand, the students could adjust to the educational system, for example, working better or more. But on the other hand, it could be the teacher or the school (the environment) that adjusts to the student, for example, through changes in the ways of educating (adjustment of the environment). A third way would be to enroll or change the student to a school more suited to its way of being (selection of the environment). It is important to contemplate all these options, because if they are not able to improve the performance of students, there would be the undesired fourth option that is similar to natural selection: school failure.”

The researchers tested the theoretical framework in different contexts, and in all cases, the possibilities proposed by people participating could be reduced to the four identified general processes.
This theoretical framework has been conceived as a tool to structure thoughts and research, and hopefully avoid events that frequently occur in current studies—that the processes are confused with each other, or even ignored. The classification helps to understand and take into account the full range of processes that may be relevant to organisms, including their evolution.

Contemplating them in the design of research prevents the exclusion of any of the possibilities, and to avoid conditioning the results of the study. “Traditionally, it has been stated that natural selection is the only force driving adaptive evolution. This study opens a new door in this sense, giving more prominence to the individual and its ability to change its environment. It is not always the organism that adjusts to the environment. It is important that this option is contemplated conceptually. With this classification table, a greater diversity of possibilities is recognized and appreciated,” says Edelaar.

In order to put this theoretical framework into practice, Dr. Edelaar and colleagues have designed a series of novel experiments that are currently being carried out with the Zebra finch and the Fruit fly to test, among other objectives, whether their voluntary selection of environments is able to generate an evolutionary divergence between populations and even to produce different species.

SALTIER WATERWAYS ARE CREATING DANGEROUS ‘CHEMICAL COCKTAILS’

by University of Maryland

A recent study led by University of Maryland researchers found that streams and rivers across the United States have become saltier and more alkaline over the past 50 years, thanks to road deicers, fertilizers and other salty compounds that humans indirectly release into waterways. The team named this effect “Freshwater Salinization Syndrome.”

New research from the same UMD-led group takes a closer look at the global,
regional and local consequences of Freshwater Salinization Syndrome. The group found that salty, alkaline freshwater can release a variety of chemicals, including toxic metals and harmful nitrogen-containing compounds, from streambeds and soils in drainage basins. The results further suggest that many of these chemicals travel together throughout watersheds, forming “chemical cocktails” that can have more devastating effects on drinking water supplies and ecosystems when compared with individual contaminants alone.

The group’s latest work, which includes field observations from the Washington, D.C. and Baltimore metropolitan areas, highlights the need for new and more comprehensive regulation and pollution management strategies. The research team published its findings December 3, 2018 in the journal *Philosophical Transactions of the Royal Society B*.

“The bottom line of our findings is that when humans add salt to waterways, that salt also releases a lot of dangerous collateral chemicals,” said Sujay Kaushal, a professor of geology at UMD and lead author of the study. “It’s clear that regulatory agencies need to find new ways to address these ‘chemical cocktails’ released by saltier water, rather than looking at individual freshwater pollutants one by one.”

Salty, alkaline freshwater is already known to create big problems for drinking water supplies, urban infrastructure and natural ecosystems. For example, when Flint, Michigan, switched its primary water source to the Flint River in 2014, the river’s high salt load combined with chemical treatments to make the water more corrosive, causing lead to leach from water pipes and creating that city’s well-documented water crisis.

Kaushal and his colleagues’ latest research project investigated the impacts of chemical cocktails created by saltier water in more detail. The group began by assessing previously published data from rivers in the U.S., Europe, Canada, Russia, China and Iran, substantially expanding the geographic boundaries of the researchers’ previous work. Their analysis suggests that Freshwater Salinization Syndrome could be a global phenomenon, with the most conclusive support showing a steady trend of increased salt ions in both U.S. and European rivers. These trends trace back at least 50 years, with some data reaching back far enough to support a 100-year trend.

“Given what we are finding, I continue to be surprised by the scope and magnitude of the recent degradation of Earth’s surface waters,” said *study co-author Gene Likens*, president emeritus of the Cary Institute of Ecosystem Studies and a distinguished research professor at the University of Connecticut. “The formation of novel chemical cocktails is causing deterioration far beyond my expectations.”

In the snowy Mid-Atlantic states and New England, road salt applied to roadways in winter is a primary cause of Freshwater Salinization Syndrome. Kaushal and his colleagues took a deeper dive into the chemical consequences of road salt by performing detailed field studies in streams located near Washington, D.C. and Baltimore.

In one set of observations, the researchers sampled water from the Paint Branch stream near the UMD campus before, during and after a 2017 snowstorm. This aspect of the study allowed the team to trace the effects of road salt washed into the streams by the melting snow.

“We thought it would be interesting to get a view of the chemistry in an urban river throughout a snowstorm,” said Kelsey Wood (B.S. ’15, geology), a geology graduate student at UMD.
and a co-author of the study. “Salt concentrations during the snowstorm were surprisingly high—it was like we were analyzing sea water. But we weren’t expecting such a high corresponding peak in metals.”

Previous research has shown that very salty water can force metals—especially copper, cadmium, manganese and zinc—out of streambed soils and into stream water. In the Paint Branch stream, Kaushal and his colleagues noted large spikes in copper, manganese and zinc immediately following the snowstorm. In a similar set of observations in Washington, D.C.’s Rock Creek, the team observed notable spikes in cadmium, copper and zinc following other snowstorms.

In another series of experiments, the researchers artificially added salt to the Gwynns Falls stream near Baltimore to simulate what happens during a snowstorm and measured copper concentrations in the water before, during and after adding salt. The downstream data showed an instant spike in copper released from the streambed, suggesting a direct connection between the stream’s salt content and copper in the water.

Salt ion concentrations can stay high for months following a storm, Kaushal added. This lengthens the amount of time that salt can draw metals from the soil, resulting in harmful cocktails of metals and salts transported far downstream.

“Looking at water quality data over several months in the winter, salt remains high and rarely has a chance to return to baseline before the next storm comes through and more salt is put on the roads,” said Kaushal, who also has an appointment in UMD’s Earth System Science Interdisciplinary Center. “This high salt load not only liberates metals and other contaminants, but there is also evidence that the initial salt pulse releases other salt ions from the streambed and soils, such as magnesium and potassium, which further contribute to keeping overall salt levels high.”

In the heavily agricultural Midwest and areas of the Mid-Atlantic states, agricultural fertilizers are a significant cause of Freshwater Salinization Syndrome. To investigate further, the research team looked at water quality data from 26 different U.S. Geological Survey (USGS) monitoring sites along rivers in these areas.

These USGS stations collected data every 15 minutes on salinity, pH and nitrate ions—a harmful byproduct of agricultural fertilizers and other contaminants. These high-frequency measurements gave the research team valuable real-time insights, with several of the rivers showing a clear and nearly immediate connection between increased salinity and nitrate concentrations.

“To me, this study highlights the need to view salt as an emerging contaminant in freshwater,” said Shahan Haq (B.S. ’14, physical sciences), a geology graduate student at UMD and a co-author of the study. “Salt’s ability to move heavy metals like copper from sediments into the water could have dangerous implications for our drinking water and could be toxic to wildlife. Our observations suggest that some rivers are already at risk, especially here in the eastern U.S. directly following road salt applications.”
Instead of throwing away your broken boots or cracked toys, why not let them fix themselves? Researchers at the University of Southern California Viterbi School of Engineering have developed 3-D-printed rubber materials that can do just that.

Assistant Professor Qiming Wang works in the world of 3-D printed materials, creating new functions for a variety of purposes, from flexible electronics to sound control. Now, working with Viterbi students Kunhao Yu, An Xin, and Haixu Du, and University of Connecticut Assistant Professor Ying Li, they have made a new material that can be manufactured quickly and is able to repair itself if it becomes fractured or punctured. This material could be game-changing for industries like shoes, tires, soft robotics, and even electronics, decreasing manufacturing time while increasing product durability and longevity.

The material is manufactured using a 3-D printing method that uses photopolymerization. This process uses light to solidify a liquid resin in a desired shape or geometry. To make it self-healable, they had to dive a little deeper into the chemistry behind the material.

Photopolymerization is achieved through a reaction with a certain chemical group called thiols. By adding an oxidizer to the equation, thiols transform into another group called disulfides. It is the disulfide group that is able to reform when broken, leading to the self-healing ability. Finding the right ratio between these two groups was the key to unlocking the materials’ unique properties.

“When we gradually increase the oxidant, the self-healing behavior becomes stronger, but the photopolymerization behavior becomes weaker,” explained Wang. “There is competition between these two behaviors. And eventually we found the ratio that can enable both high self-healing and relatively rapid photopolymerization.”

In just 5 seconds, they can print a 17.5-millimeter square, completing whole objects in around 20 minutes that can repair themselves in just a few hours. In their study, published in NPG Asia Materials, they demonstrate their material’s ability on a range of products, including a shoe pad, a soft robot, a multiphase composite, and an electronic sensor.

After being cut in half, in just two hours at 60 degrees Celsius (four for the electronics due to the carbon used to transmit electricity) they healed completely, retaining their strength and function. The repair time.
can be decreased just by raising the temperature.

“We actually show that under different temperatures—from 40 degrees Celsius to 60 degrees Celsius—the material can heal to almost 100 percent,” said Yu, who was first-author of the study and is studying structural engineering. “By changing the temperature, we can manipulate the healing speed, even under room temperature the material can still self-heal”

After conquering 3-D-printable soft materials, they are now working to develop different self-healable materials along a range of stiffnesses, from the current soft rubber, to rigid hard-plastics. These could be used for vehicle parts, composite materials, and even body armor.

Digital Trends

ARTIFICIAL ‘SUPERHUMAN’ SKIN COULD HELP BURN VICTIMS, AMPUTEES ‘FEEL’ AGAIN

By Dyllan Furness

Researchers have developed a new kind of sensor designed to let artificial skin sense pressure, vibrations, and even magnetic fields. Developed by engineers, chemists, and biologists at the University of Connecticut and University of Toronto, the technology could help burn victims and amputees “feel” again through their prosthetic skin.

“The type of artificial skin we developed can be called an electronic skin or e-skin,” Islam Mosa, a postdoctoral fellow at UConn, told Digital Trends. “It is a new group of smart wearable electronics that are flexible, stretchable, shapable, and possess unique sensing capabilities that mimic human skin.”

To create the sensor for the artificial skin,
Mosa and his team wrapped a silicone tube with a copper wire and filled the tube with an iron oxide nanoparticle fluid. As the nanoparticles move around the tube, they create an electrical current, which is picked up by the copper wire. When the tube experiences pressure, the current changes.

Beyond its ability to sense environmental changes similar to human skin, the e-skin can even feel magnetic field and sound wave vibrations.

The goal was to develop an artificial skin that could sense beyond human capabilities, according to Abdelsalam Ahmed, a postdoctoral fellow at the University of Toronto who worked on the project.

“A big motivation to develop this e-skin sensor was to extend the capabilities of this technology to superhuman abilities,” he said. “We proved that e-skin can alarm humans of the surrounding danger before accidents happen.”

The researchers think the invention will find applications in hazard prevention electronics, rescue robotics, and next-generation remote health care monitoring.

Moving forward, the researchers will attempt to flatten the tubular prototype so that it can function more effectively as a skin layer. They'll also need to make sure the e-skin is completely biocompatible.

The current prototype costs less than $5 per sensor, according to Mosa, though the market price is expected to be higher after further research and development, testing, and U.S. Food and Drug Administration approval. The researchers have launched a company to commercialize the invention and aim to bring it to market in the next few years.

A paper detailing their work was published this week in the journal *Advanced Materials*. ⚫
Many people think a snake’s forked tongue is creepy. Every so often, the snake waves it around rapidly, then retracts it. Theories explaining the forked tongues of snakes have been around for thousands of years. Aristotle reasoned that it provided snakes with “a twofold pleasure from savours, their gustatory sensation being as it were doubled”.

Italian astronomer Giovanni Hodierna thought snake tongues were for cleaning dirt out of their noses. Some 17th-century writers claimed to have watched snakes catch flies or other animals between the forks of their tongues, using them like forceps. It is a common myth even today that snakes can sting you with their tongues. But none of those hypotheses is likely.

Most animals with tongues use them for tasting, to clean themselves or others, or to capture or manipulate their prey. A few, including humans, also use them to make sounds. Snakes do not use their tongues for any of these things. Over the past 20 years, Kurt Schwenk, an evolutionary biologist at the University of Connecticut, has been working on understanding the function of snake tongues, and “smelling” is the closest description of what snakes do with their tongues.

**Tongues That Smell**

Snakes use their tongues for collecting chemicals from the air or ground. The tongue does not have receptors to taste or smell. Instead, these receptors are in the vomeronasal, or Jacobson’s Organ, which is in the roof of the mouth. Once inside the Jacobson’s Organ, different chemicals evoke different electrical signals which are relayed to the brain.

It was once thought that the tongue delivered chemicals directly to the Jacobson’s Organ, because both the organ and the pathways that lead to it are paired just like the tips of the tongue. But X-ray movies have revealed that the tongue does not move inside the closed mouth; it simply deposits the chemicals it has collected onto pads on the floor of the mouth as the mouth is closing.

It is most likely that these pads deliver the sampled molecules to the entrance of the Jacobson’s Organ when the floor of the mouth is elevated to come into contact with the roof following a tongue flick. The case for this is strengthened because geckos, skinks, and other lizards lack deeply-forked tongues but still deliver chemicals to their vomeronasal organs.
Smelling in 3D

Because it is forked, the tongue of a snake can collect chemical information from two different places at once, albeit places that are fairly close together by human standards. When snakes spread the tips of their tongues apart, the distance can be twice as wide as their head. This is important because it allows them to detect chemical gradients in the environment, which gives them a sense of direction — in other words, snakes use their forked tongues to help them smell in three dimensions. Owls use their asymmetrical ears in this way to detect sound in three dimensions.

Snakes and owls use similar neural circuitry to compare the signal strength delivered from each side of the body and determine the direction that a smell or a sound is coming from. Humans do this with their hearing, too, but not as effectively.

This makes it possible for snakes to follow trails left by their prey or potential mates. In the 1930s, before guidelines on the ethical use of animals in research were as strict, German biologist Herman Kahmann experimentally removed the forked part of snakes’ tongues and found that they could still respond to smells, but that they had lost their ability to follow scent trails. These results were refined and confirmed during the 1970s.

Sniffing Out Sex

In the 1980s, snake biologist Neil Ford at the University of Texas at Tyler watched how male garter snakes used their tongues when they were following pheromone trails left behind by females. He found that if both tips of the male snake’s tongue fell within the width of the trail, the snake continued slithering straight ahead. However, when one tip or the other fell outside the edge of the trail, the snake turned his head away from that tip and back towards the pheromone trail, and his body followed. Following this simple rule allowed the snakes to perform trail-following behavior that was both accurate and directed. If both tongue tips ever touched the ground outside of the trail, the male would stop and swing his head back and forth, tongue-flicking, until he relocated the trail.

Snake ecologist Chuck Smith at Wofford College found evidence that male Copperheads have longer, more deeply forked tongues than females, which presumably enhances their ability to find mates. Although sexual dimorphism — where one sex is markedly different from the other — is rare in snakes, differences in tongue size are likely to be present in other species as well.

Scent-trailing is probably also quite helpful to snakes tracking down prey, including for sit-and-wait predators like vipers, which have evolved smelly but non-toxic venom components to help them relocate their bitten and envenomated prey.

When following a scent-trail, snakes simply touch their tongue tips down to the ground to pick up the chemical information lying there. But snakes can also use a different type of tongue-flick to sample airborne chemicals.

Snakes often wave their tongues in the air without putting them in contact with anything. The tongue creates air vortices, such as those formed in the water behind a boat. These vortices drift away from the boat as they form. Bill Ryerson, a student in the Schwenk lab, found that vortices created in the air by snake tongues have a special property — they do not drift away but rather stay in the vicinity of the tongue, where they can be sampled repeatedly as the tongue skirts the part of each vortex where the air velocity is the highest.

Oscillating tongue-flicks are unique to snakes. They allow snakes to sample
100 times as much air as the simple downward extension of the tongue. The tongue then transfers these molecules to the Jacobson’s Organ via the mouth floor. Evidence suggests that male Copperheads can also find and follow females using oscillating tongue-flicks to detect airborne pheromones, although the details of how they determine direction using such dispersed and transient odors are still poorly understood. ●

This article was originally published on The Conversation by Andrew Durso.

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**UCONN RESEARCH PROJECT HEADING TO INTERNATIONAL SPACE STATION**

By Staff Writers

An experiment devised by researchers at UConn startup LambdaVision will be launched into space tomorrow. The company’s robotic system to manufacture films that could cure blindness will be brought to the International Space Station U.S. National Laboratory by the SpaceX Dragon spacecraft.

The experiment is one of a diverse group of research investigations intended to benefit life on Earth that the Dragon spacecraft will bring to the orbiting research platform. With more than 20 payloads, including the one from LambdaVision, the mission represents the largest number of payloads ever delivered to the ISS National Lab during a single launch.

LambdaVision Inc. was based on research by Robert Birge, professor emeritus in UConn’s Department of Chemistry. He first considered using bacteriorhodopsin, a light-activated protein, more than 15 years ago to correct age-related blindness. Today, the company is commercializing its technology in the hopes of restoring vision for millions of patients suffering from retinitis pigmentosa and age-related macular degeneration.

LambdaVision’s retinal implant is similar to a contact lens that is surgically
placed in the back of the eye to convert light into energy. The implant doesn’t need hardware or electrodes to send electrical pulses into the eye. Instead, the bacteriorhodopsin-coated membrane replaces native photoreceptor cells in the retina to restore vision.

LambdaVision is led by UConn alumni and former students in Birge’s research group, Nicole Wagner ’07 (CLAS), ’13 Ph.D., and Jordan Greco ’10 (CLAS), ’15 Ph.D.

“Our preliminary animal studies show that the protein-based implant is capable of stimulating the retina,” Wagner says. “When the protein absorbs light, it sends signals to the remaining neural circuitry of the retina, which allows it to communicate with the brain. We expect a similar outcome in human patients.”

Currently, LambdaVision manufactures its prosthetics at its headquarters at UConn’s Technology Incubation Program facility in Farmington, Connecticut. Producing the flexible, tiny films is a time-consuming process — on this planet, at least.

On Earth, it takes LambdaVision approximately five days for each of its three robotic stations to produce an implant. The process involves a series of alternating dipping steps, which are subject to the effects of gravity. Once complete, the process results in a membrane approximately 60 um (micrometers) thick. A micrometer is one-millionth of a meter.

In the weightless conditions of the International Space Station, LambdaVision anticipates producing a more homogeneous and stable film. If successful, Wagner and Greco anticipate that they can generate a similar signal with fewer layers of protein. This would drastically decrease the time for manufacturing, and save on the cost of materials.

“On Earth, issues like sedimentation of solutions and surface tension can interfere with the homogeneity and stability of the thin films, but in microgravity these issues are minimized,” says Greco. “We are manufacturing them now in microgravity as an experiment; however, if successful, we think it could ultimately help us generate more stable films with better performance, and accelerate our time to market.”

LambdaVision was selected for this highly competitive opportunity as part of the company’s experience in the startup accelerator MassChallenge in 2016, when the researchers received the CASIS-Boeing Award, along with a share of $500,000 in funding. Since it was incorporated in 2009, LambdaVision has raised nearly $3 million from state, local, and government grants, including support from Connecticut Innovations, CASIS-Boeing, and the National Science Foundation.

Wagner estimates the total value of the MassChallenge prize to be approximately $7 million in resources.

To ensure that the complicated space experiments go smoothly, LambdaVision is partnering with Space Tango, a Lexington, Kentucky-based company. LambdaVision will miniaturize the dipping set up and prepare it for space travel. Space Tango can initiate and control the software and run LambdaVision’s experiments from Earth. The experiment will run for approximately six weeks in space before being transported back to Earth.

Birge, Wagner, and Greco hope this experiment will represent another step closer to a cure for the millions of people suffering from age-related blindness.

“We’ve met a lot of people who are suffering or have family members who have these diseases, and we work hard every day to develop a viable treatment.
option that can improve their quality of life,” says Greco. “We’re continually encouraged by our preliminary results. We anticipate being at the steps of the clinic by the end of 2020.”

With their technology set to launch into space, Wagner thinks back on the technology’s roots in Storrs and the local support that has helped LambdaVision succeed.

“This all started in Dr. Birge’s laboratory on North Eagleville Road in Storrs,” she says. “Since then, UConn has been incredibly supportive in the development of our technology, providing access to top tier scientists, facilities, and resources.

“We could have relocated out of state, but we chose to keep our company in Connecticut in Farmington, which gave us access to other innovation hubs in New York and Massachusetts,” she continues. “Connecticut also has talented employees and resources like Connecticut Innovations to help us get the technology off the ground - no pun intended.”

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**World’s First Gene Therapy for Glycogen Storage Disease Produces Remarkable Results**

Consuming cornstarch every few hours has been the only available option for survival

By University of Connecticut

At the Association for Glycogen Storage Disease’s 41st Annual Conference, Dr. David Weinstein of UConn School of Medicine and Connecticut Children’s presented his groundbreaking, one-year clinical trial results for the novel gene therapy treatment for glycogen storage disease (GSD).
The rare and deadly genetic liver disorder, GSD type Ia, affects children from infancy through adulthood, causing dangerously low blood sugar levels and constant dependence on glucose consumption in the form of cornstarch every few hours for survival. If a cornstarch dose is missed, the disease can lead to seizures and even death.

Weinstein, whose team first administered the investigational gene therapy at UConn John Dempsey Hospital in Farmington, Connecticut, on July 24, 2018, calls the results “remarkable.”

One year after patient Jerrod Watts first received the GSD vaccine during a 30-minute infusion, he is completely off of cornstarch. In addition to totally stopping daily cornstarch consumption, Watts has experienced normal regulation of his blood glucose levels, weight loss, increased muscle strength, and marked improvement in his energy.

“The clinical trial is going better than expected. The therapy is transforming patient lives,” says Weinstein. “We have seen all of the patients wean their therapy with some already discontinuing treatment. Missed cornstarch doses no longer are resulting in hypoglycemia, which previously could have been life threatening.”

Weinstein, the clinical trial’s lead investigator, is pediatric endocrinologist-scientist who cares for more than 700 GSD patients from 51 countries as director of the Glycogen Storage Disease Program at Connecticut Children’s and UConn Health -- the largest center in the world for the care and treatment of this condition.

The clinical trial, conducted in conjunction with the biopharmaceutical company Ultragenyx, originally set out to simply test the safety and dosage of the gene therapy for three patients with GSD Type Ia.

The gene therapy works by delivering a new copy of a gene to the liver via a naturally occurring virus. Administered through the patient’s bloodstream, the new copy replaces deficient sugar enzymes caused by the disease and jump starts the body’s glucose control.

Both Weinstein and Watts were surprised by Watts’ response to the gene therapy.

“We were just making sure it was safe for humans to take, that was our initial goal. The results are way beyond my imagination,” says Weinstein. “The patients who are finishing the first year got what we all thought was a test dose -- one-third strength -- yet the response has been dramatic. They can now go through the night without any treatment and they wake up clinically well.”

Prior to the treatment, Watts was consuming more than 400 grams of cornstarch per day. The GSD Program’s multidisciplinary team at Connecticut Children’s provides comprehensive clinical care to patients, while the program’s research laboratories and clinical trial are located at UConn School of Medicine at UConn Health.

“We the main thing I want to do is inspire hope. One of the biggest reliefs from this gene therapy is I can now sleep through the night without worrying about dying in the middle of the night. I wake up 6 to 7 hours later with normal blood sugar.”
“I’m living, breathing proof that there is a light at the end of the tunnel with GSD. I’m a completely different person now that I was a year ago. I feel like I can live a normal life and I can do anything I want to do now,” says Watts.

His message to other patients: “Please don’t give up hope.”

In addition to Watts, two other clinical trial cohort patients are seeing promising results on the lower cornstarch daily regimens. All three will participate in the next phase -- a 4-year follow-up clinical trial study. In addition, three patients are enrolled in clinical trial testing a higher gene therapy dose.

“What’s exciting is if it works this well with the low dose, what does the future hold?,” says Weinstein.” If the patients are already coming off cornstarch and the labs are getting better, we just hope it will be even faster and more dramatic with the higher dose.”

“This gene therapy treatment is something we’ve worked on for 21 years. This means so much to the glycogen storage disease community,” says Weinstein. “To see patients off cornstarch and doing so well really is a culmination of an incredible journey ... We feel like we’re living history.”
CONSUMERS: ONLINE RESTAURANT REVIEWS ARE NOT ALL EQUAL

In a study of 275,000 restaurant reviews, researchers from the University of Connecticut, Boston College, and Peking University found differences in reader perception based on the platform where the review was generated.

With the increasing prevalence of mobile devices and apps such as TripAdvisor, Yelp, and Google, consumers have ready access to real-time reviewing platforms.

“While consumers initially value real-time mobile content similarly to nonmobile content, over time they seem to observe distinct differences in platform-specific content and, as the mobile platform matures, they come to view mobile reviews as less helpful,” said Nicholas Lurie.

Lurie, Voya Financial Professor in the UConn School of Business, co-authored the study with former associate professor of marketing Hongju Liu, now of Peking University; and Sam Ransbotham of Boston College.

The authors analyzed the writings of 117,827 reviewers who described their experiences at 13,976 restaurants, along with a dual-platform sample of 21,026 reviews that were written by 673 reviewers who wrote at least four mobile, and four non-mobile reviews.

Mobile reviews were associated with 10 to 40% less likes than the reviews generated on laptop or desktop computers.

An analysis of how word-of-mouth value changed after the introduction of the mobile application shows that, although mobile word of mouth initially had equal or greater consumption value, over time it became significantly lower than computer generated word-of-mouth.

One reason may be that the real-time nature of mobile device reviews does not allow reviewers enough time to reflect. The real-time creation process associated with mobile platforms affected the consumption through associations with the mobile label and information quality.

The results indicate that writing reviews on mobile platforms may not be useful to an end-user, they may be valuable to the writer. “Writing reviews may be therapeutic and help consumers make sense of their experiences — raising the value for review writers if not for those who read reviews,” the authors note.

“Encouraging word-of-mouth through mobile reviews has pros and cons,” said Ransbotham. “Because mobile reviews may not benefit from reflection, mobile platforms may actually be encouraging feedback from less-engaged customers.”
NEANDERTHALS KNEW HOW TO START FIRE, NEW RESEARCH SHOWS

Middle Paleolithic hominins such as Neanderthals not only controlled fire, but also mastered the ability to generate it.

“Fire was presumed to be the domain of Homo sapiens but now we know that other ancient humans like Neanderthals could create it. So perhaps we are not so special after all,” said Dr. Daniel Adler, a researcher in the Department of Anthropology at the University of Connecticut.

Dr. Adler and his colleagues from Armenia, the U.S., the U.K., and Spain, looked at sediment samples from Lusakert Cave in the Armenian Highlands to determine the abundance of polycyclic aromatic hydrocarbons (PAHs), which are released when organic material is burned.

One type of PAH called light PAHs, disperse widely and are indicative of wildfires while others, called heavy PAHs, disperse narrowly and remain much closer to the source of fire.

“Looking at the markers for fires that are locally made, we start to see other human activity correlating with more evidence of locally-made fire,” said lead author Alex Brittingham, a doctoral student at the University of Connecticut.

Evidence of increased human occupation at the Lusakert Cave site, such as concentrations of animal bones from meals and evidence of tool making, correlated with increased fire frequency and the increased frequency of heavy PAHs.

The team also needed to rule out the possibility that unsettled weather, which gives rise to lightning, had ignited the fires.

To do so, the scientists analyzed hydrogen and carbon isotope composition of the waxy cuticles of ancient plant tissues preserved in sediments. The distribution of these leaf waxes indicate what kind of climate the plants grew in.

“We could not find any evidence of a link between overall paleoclimatic conditions and the geochemical record of fire,” said Dr. Michael Hren, also from the University of Connecticut.

“In order to routinely access naturally caused fires, there would need to have been conditions that would produce lighting strikes at a relative frequency that could have ignited wildfires.”

By pairing the climate data with the evidence found in the archaeological record, the researchers then determined the cave’s inhabitants were not living in drier, wildfire-prone conditions while they were utilizing fires within the cave.

“In fact, there were fewer wildfires for these ancient humans to harvest at the time when fire frequency and heavy PAH frequency was high in the cave,” Brittingham said.

“It seems they were able to control fire outside of the natural availability of wildfires.”
Hubble astronomers have assembled the largest, most complete image of the universe ever recorded, by stitching together data gathered by multiple telescopes over years of observations.

Back in 1995, astronomers created the first attempt at imaging the deep universe by having Hubble “stare” at an empty patch of sky for one million seconds. The resulting image, the Hubble Deep Field, became one of the most popular space photographs ever taken. It’s the feature image for this article. But the HDF was an extremely small photo. It focused on approximately one 24-millionth of the sky. Later surveys, including the Great Observatories Origins Deep Survey, Hubble Ultra-Deep Field, and eXtreme Deep Field, built on this initial imaging with additional telescopes, or examined a different area of the sky in greater detail (the original HDF imagined an area of space within Ursa Major, while the UDF and XDF both focused on an area of space in the constellation Fornax). New cameras added to the Hubble after 1995 were also used in some of these surveys.

Astronomers have created this latest image, dubbed the Hubble Legacy Field, by combining data used in previous sky surveys. Here’s HubbleSite.org:

Now, astronomers are releasing a new deep-field image by weaving together exposures from several of these previous galaxy “fishing expeditions.” Their efforts have produced the largest, most comprehensive “history book” of galaxies in the universe. The snapshot, a combination of nearly 7,500 separate Hubble exposures, represents 16 years’ worth of observations. The ambitious endeavor is called the Hubble Legacy Field. The new view contains about 30 times as many galaxies as in the HUDF. The wavelength range stretches from ultraviolet to near-infrared light, capturing all the features of galaxy assembly over time.

The image mosaic presents a wide portrait of the distant universe and contains roughly 265,000 galaxies. They stretch back through 13.3 billion years of space.
time to just 500 million years after the universe’s birth in the big bang.

And here, without further ado, is the aforementioned Hubble Legacy Field: containing a history of galactic formation, from the infancy of the earliest galaxies, composed entirely of metal-poor stars, to more recent galaxies and star systems (larger galaxies are generally closer to us, and therefore “nearer” both in physical distance and time).

“Such exquisite high-resolution measurements of the numerous galaxies in this catalog enable a wide swath of extragalactic study,” said catalog lead researcher Katherine Whitaker of the University of Connecticut, in Storrs. “Often, these kinds of surveys have yielded unanticipated discoveries which have had the greatest impact on our understanding of galaxy evolution.”

Previously, the single images that make up the Hubble Legacy Field had not been assembled in a consistent way that made them easy for researchers to use.

This is expected to be the largest, highest-resolution available image of distant galaxies until next-generation telescopes like the James Webb are online and available. The same team that built this image is now working to construct other mosaics like it, with the hope of widening their work to include data captured in non-visible spectrums like long-wavelength infrared and high-energy X-ray observations.

**HEMP TESTING LAB LAUNCHED IN RESPONSE TO INDUSTRY NEED**

**By University of Connecticut**

In response to a rapidly expanding commercial hemp industry driven by interest in products with CBD oil, the University of Connecticut recently opened a laboratory where the plant can be tested for a variety of compounds.

As part of the Center for Environmental Sciences and Engineering’s Hemp Initiative, the UConn facility will support the efforts of growers, manufacturers, and researchers,
and educate students interested in entering the field.

A non-intoxicating marijuana extract, cannabidiol—commonly known as CBD—has made its way into products treating everything from anxiety to seizures to pain. This fall marks the culmination of the state’s first growing season since federal legislation to legally grow and harvest the hemp crop, which produces the oil.

After last year’s passage of the Farm Bill, many Connecticut growers invested in new economic opportunities with hemp agriculture.

Hemp, a fiber of the cannabis plant, is considered marijuana if the level of a principal active chemical is above a specific percentage. But tetrahydrocannabinol (THC) levels can vary among individual plants, and even within the same plant, depending on the genetics and conditions in which the plant is grown.

Therefore to comply with federal regulations, licensed growers are required to have the THC level tested on the crop pre-harvest. The process requires growers to take samples from a number of plants within a crop and have them tested.

“As a producer, you want to ensure that you are not only legal but also that your product is safe and has the level of CBD compounds you hope will be promoting the health of those who are using the products,” says Michael Willig, executive director of the Institute of the Environment and Center for Environmental Sciences and Engineering.

“Consumers want to know that what is on the label is what they are taking, and that this information is consistent,” he adds.

When THC levels are below or equal to 0.3%, the plant is simply considered hemp. Above that level, the plant is considered marijuana, which is still recognized as a drug by the United States Drug Enforcement Administration.

The labs in the Center for Environmental Sciences and Engineering have been a resource for accurate and non-biased environmental testing for years, says Willig, so it seemed natural that the lab could also accommodate the needs of the state’s growing hemp industry.

While there are privately owned labs performing the same testing in the state, the Center for Environmental Sciences and Engineering is the only university lab currently seeking accreditation for the analysis of hemp and hemp-derived products in the United States. The accrediting body, the International Standards Organization (ISO), has stringent testing, record keeping, and traceability standards.

Since it opened in mid-September, the facility has already begun testing samples from over 25 growers state-wide, roughly one-third of the licensed farms in the state.

“We have received samples largely due to word of mouth as well as by referrals from UConn Extension educators,” says Christopher Perkins ‘89 (CAHNR) ‘95 MS, Center for Environmental Sciences and Engineering laboratory director.

The rapid growth of the lab’s client base indicates the demand for testing facilities, and the university’s dedication to supporting economic growth in the state. There is only one other state testing facility in Connecticut, located at the Connecticut Agricultural Experiment Station, which tests for THC.

In the near future, the UConn lab will be able to also provide analyses of samples post-processing, which requires quantification of a more comprehensive
suite of chemicals including pesticides, terpenes, metals, and microbes. That capability is expected to be in place by mid-November, says Perkins.

Beyond supporting the needs of the local agricultural industry, the new testing facility is providing valuable training to UConn students, to prepare graduates for roles in this rapidly growing field. In addition to medical products, the hemp plant also produces fiber for fabrics and building materials.

“We have amazing students who are highly qualified but not necessarily in all aspects of the hemp business. The quality control and quality assurance testing this lab performs and teaches are not skills typically taught at a university,” says Willig.

“This facility hopes to expand to include a dedicated teaching facility that will educate the next generation of professionals for managing and running labs like this in the public or private sector.”
UNIVERSITY CENTER TO RESEARCH WAYS TO PROTECT ELECTRONIC SYSTEMS FROM SABOTAGE

by Lance Whitney

Led by the University of Cincinnati, the new center will work with government and industry to conduct research on how to defend electronics and embedded systems from sabotage, hacking, and spying.

We face a variety of technological threats and hazards as individuals, as members of organizations, and as citizens of a country. But one particularly alarming threat is the ability of hackers to infiltrate and sabotage the underlying hardware embedded into the electronic systems that we use as a society. Projects have been launched worldwide to study how to best thwart attempts to undermine such technology. Now, the University of Cincinnati is teaming up with various partners to investigate new ways to defend embedded systems from outside attack.

As described in a news item from the University of Cincinnati, the goal of the new research center sponsored by the National Science Foundation (NSF) is to help companies, consumers, and the military protect their electronic devices from hacking or tampering. The NSF will fund the center with a starting grant of $4.5 million, which will go toward UC and the other participating universities: The University of Virginia, University of Connecticut, Northeastern University, the University of Texas at Dallas, and the University of California, Davis.

To conduct the research, the center will work with the NSF, the U.S. Department of Defense, and such companies as Verizon, Edaptive Computing, Booz Allen Hamilton, and engineering firm Wyle. So far, the center has attracted the interest of 70 different organizations, 26 of which have already signed up and will contribute annual fees as high as $50,000 to lend their expertise toward the project.

One item on the agenda is finding a way to ensure the authenticity of computer chips. The use of counterfeit chips in embedded systems is a danger as it could lead to failures in aviation, communications, and weapons equipment.

“The issue most important to industry is information technology protection,” UC engineering professor John ‘Marty’ Emmert said in the news report. “Part of our mission will be to develop techniques to avoid circuit counterfeiting.”

The effort will be a difficult one as flaws can be intentionally introduced into hardware systems at any stage in
their development. The hope is that the combined brain trust of all the project participants can create and construct the right solutions.

“There are enormous challenges associated with the design, protection, and resilience of electronic hardware and embedded systems,” James Lambert, a University of Virginia professor who represents one of the center’s academic partners, said in the news report. “Vulnerabilities to cyberattacks can be introduced during design, manufacturing, or any stage of the product life cycle. By working with industry and government partners to understand what the real issues are and to ask the right questions, we are helping to address security, assurance, and trust across all stages.”

**TYPE 2 DIABETES: WEIGHT REGAIN REDUCES CARDIOVASCULAR BENEFITS**

Recent studies have shown that people with type 2 diabetes who lose weight lower their risk of cardiovascular problems. But what happens if, after a time, they regain the weight they had lost?

By University of Connecticut

Overweight and obesity are two of the top risk factors for developing type 2 diabetes, a metabolic condition in which the body is unable to process blood sugar effectively.

Once someone does develop diabetes, doctors will often suggest making dietary adjustments, not just to help keep blood sugar levels in check but also for weight loss.

The aim of this intervention is to help reduce the risk of stroke, heart disease, and other cardiovascular problems that have an association with diabetes.

Studies have confirmed that the more weight a person with diabetes loses, the more their cardiovascular risk diminishes. What happens, though, if a person regains some or all of that weight at some point?
That is the question that researchers from Tufts University in Boston, MA, and the University of Connecticut in Storrs aimed to answer in a recent study.

The study results — which appear in the Journal of the American Heart Association — suggest that maintaining weight loss is just as important as losing weight in the first place when it comes to keeping heart disease and health events, such as stroke, at bay.

**Weight loss maintenance is crucial**

The research team analyzed the data of 1,561 individuals with type 2 diabetes who took part in the Look AHEAD (Action for Health in Diabetes) trial. The program helped participants lose weight by forming more healthful eating habits and increasing their levels of physical activity.

The participants also received standard care for type 2 diabetes, which included information on managing this condition and targeted support.

The current trial looked at the data from participants who had an initial weight loss of at least 3% body weight as part of the 1 year intensive lifestyle intervention. They also looked at the follow-up data that Look AHEAD collected 4 years after the lifestyle intervention.

As part of the 3 year maintenance phase following the 1 year intervention, the participants attended monthly group meetings. They also continued to receive dietary recommendations and to participate in their physical activity program.

The researchers found that the people who had regained all or some of the weight that they had initially lost experienced a “deterioration” of the cardiovascular risk reduction that weight loss had provided.

In contrast, individuals with type 2 diabetes who had shed at least 10% of their initial body weight as part of the trial and managed to keep at least 75% of that weight off over the 4 year follow-up period maintained the cardiovascular benefits or even experienced an increase in risk reduction.

The risk factors that improved in people who lost weight and then maintained this weight loss included high density lipoprotein cholesterol (also known as “good” cholesterol), triglycerides, glucose (sugar), blood pressure, waist circumference, and overall diabetes symptom control.

“Our findings suggest that in addition to focusing on weight loss, an increased emphasis should be placed on the importance of maintaining the weight loss over the long term,” says senior author Prof. Alice Lichtenstein.

**“The bottom line is that maintaining the majority of the weight loss is essential to reducing cardiovascular risk.” — Senior author Prof. Alice Lichtenstein**

Going forward, the researchers note that it is important to keep assessing the long term effects of regaining weight following a weight loss program to understand how it affects health risk in the context of a type 2 diabetes diagnosis. They also state that it is important to focus on helping people maintain the initial weight loss to improve health outcomes.
Rudd Center for Food Policy and Obesity
HOW CHILDREN GET HOOKED ON SUGARY DRINKS

Misleading marketing and labeling may confuse parents about the health value of many juices, a new report finds.

By Andrew Jacobs

Slave to your sweet tooth? Researchers say the predilection for sweetened drinks — a major driver of the nation’s obesity crisis — begins in childhood. That’s one reason health experts recommend children under 2 never be given fruit juice. When it comes to children 2 to 18, the American Academy of Pediatrics recommends a daily limit of 25 grams of sugar, or six teaspoons.

Nice try.

Last year, nearly two-thirds of the $2.2 billion in beverages marketed to children contained added sweeteners, according to a report released last week by the Rudd Center for Food Policy & Obesity at the University of Connecticut.

At a time of mounting childhood obesity, food and beverage giants like Coca-Cola, Kraft Heinz and Harvest Hill spent nearly $21 million last year advertising sugary drinks to children. Although beverage companies have been developing healthier options like blends of juice and water, the report found that the packaging and marketing of these products often leaves parents confused.

Another problem, the center found, is that drinks made with 100 percent fruit juice and those devoid of wholesome ingredients are often sold side by side in supermarket aisles.

Some of the confusion is intentional. Labels on drinks that contain no fruit juice are frequently splashed with images of apples, oranges and grapes, and many tout prodigious amounts of vitamin C. Others shout “no added sugar” on the front but bury any mention of artificial sweeteners in fine print on the back.

“I think parents are terribly confused,” said Jennifer L. Harris, the lead author of the report. “I’ve talked to parents with Ph.D.’s in public health who say they’ve been tricked into buying unhealthy drinks for their kids.”

Sugary drinks are responsible for almost half the added sugar consumed by American children, but many pediatricians remain wary of artificial sweeteners because they help cultivate a child’s sugar cravings, and they are most often added to products with little nutritional value.

“If your children gets used to sweetness, it’s going to be almost impossible to get them to drink milk or plain water,” Dr. Harris said.

The Rudd Center analyzed 23 of the best-selling children’s drinks and
ranked those with the highest sugar content and those most heavily advertised to children. The center also flagged products most likely to subtly misrepresent their front-of-label ingredients.

**Here are a few that stood out.**

**Apple & Eve Cranberry Juice Cocktail:** 28 grams of sugar

Just a single serving exceeds the recommended daily limit of sugar for children by three grams, but it gets worse: the 16-ounce bottles technically contain two servings, which means an especially thirsty child could gulp down 56 grams of sugar in one go.

Adding to the impression of wholesomeness are the profusion of bright red cranberries on the front label, the words “No High Fructose Corn Syrup!” and the tagline “100 percent Vitamin C.”

**Kool-Aid Tropical Punch Drink:** 38 grams of sugar

What it lacks in real fruit juice (it has none), this iconic childhood thirst-quencher makes up in sugar.

A lot.

A multi-serving bottle contains 38 grams of sugar per 12-ounce serving. This Kool-Aid flavor and others also dominate the list of products that use “child features” — marketing devices like cartoons, wacky names and words like “cool,” “fun” and “extreme” to appeal to children. Kool-Aid Sour Jammers topped the list, with an average of five such features per package.

**Hawaiian Punch:** 30 grams of sugar

Those who experienced their first sugar high on this birthday party staple won’t be surprised that Hawaiian Punch comes in third among the most sugar-laden children’s drinks. On the plus side, Fruit Juicy Red contains 5 percent fruit juice and no caffeine and it’s gluten free. Hawaiian Punch’s popularity helped its owner, Keurig Dr Pepper, rack up $7.4 billion in sales last year, an 11 percent increase over the year before.

**Minute Maid Lemonade:** 21 grams of sugar

With its gargantuan lemons and claims of 100 percent fruit juice, a box of Minute Maid Lemonade can give consumers the impression that it is a healthy drink option. It contains 11 percent fruit juice, and the second ingredient, after water, is high-fructose corn syrup, followed by sugar. Because supermarket refrigerators often display the lemonade side by side with 100 percent juice products, some consumers consider it as salubrious as orange juice. Also confusing: an official serving of Minute Maid Lemonade is just 6 ounces, less than a cup.

**Capri Sun Roarin’ Waters:** 8 grams of sugar

Flavored waters are one of the fastest growing categories in the drinks industry, fueled in part by the perception that they are healthy. But many of these products are sweetened with hard-to-pronounce additives like acesulfame potassium.

You wouldn’t glean that from the packaging of Capri Sun Roarin’ Waters, which touts “50 percent less sugar” and “all natural ingredients” but makes no mention of the Stevia that makes the drink so sweet. These products also have another distinction: they are far more likely to be advertised to black children than to white children. **The Rudd Center** found that the average black child 6 to 11 was likely to view Capri Sun television ads 21 times over the course of 2018, compared to 11 times for white children.

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WHEN YOU’RE TOLD YOU’RE TOO FAT TO GET PREGNANT

Does it make sense, medically or ethically, when fertility clinics refuse to treat prospective mothers they consider too large?

By Virginia Sole-Smith

The first time a doctor told Gina Balzano that she was too fat to have a baby was in 2013. She was 32, weighed 317 pounds and had been trying to get pregnant since soon after she and her husband, Nick, married in 2010. Balzano — whom I have known since high school — lives in Waltham, Mass., and works in special education. She’s the kind of person whom others often go to with their problems, but her own predicament, after three years of negative pregnancy tests, had left her feeling overwhelmed. “I’ve always had horrible, heavy, painful periods, so I thought something was wrong,” she says. “But I didn’t know enough to know what to worry about.” She told herself it was time to find out.

The couple braced themselves to hear some painful truths about fertility treatments. On average, a single cycle of in vitro fertilization costs between $10,000 and $15,000 — and that doesn’t include medications, follow-up visits or the expenses of prenatal care and childbirth. Just 10 states have a law requiring insurance companies to pay for I.V.F., and that coverage varies. The couple also knew that the experience of undergoing fertility treatments would be emotionally draining. And Balzano expected to hear about her size. She didn’t have any of the health conditions often associated with a high body weight; her blood pressure and cholesterol levels were normal, and she didn’t have diabetes or other chronic ailments. Nevertheless, it was the rare doctor who didn’t raise the subject. “When you’re fat, you get used to people assuming weight loss will fix everything wrong in your life,” Balzano says.

Conception requires four events to unfold perfectly: An ovary must release an egg; a sperm must reach and fertilize that egg; the fertilized egg must then travel through a woman’s fallopian tube and into her uterus; and finally, it must remain in the uterus, anchored in place, as it grows into a healthy fetus. Infertility results when something goes amiss during any of these steps. Reproductive endocrinologists — ob-gyns who have undergone training in the diagnosis and treatment of infertility — can facilitate the process by stimulating ovulation with drugs. If that doesn’t work, they can artificially inseminate patients or they can remove both sperm and egg, produce an embryo in a lab (the “in vitro” part of I.V.F.) and implant it back into a woman’s uterus.
During their first appointment at a large Boston fertility clinic, Balzano says, the reproductive endocrinologist was cold and unsmiling as she reviewed the couple’s medical history. Her first question was whether Balzano was ovulating. Irregular ovulation — when a woman’s ovaries fail to release eggs during the appropriate phase of the menstrual cycle — is one of the most common causes of infertility. Balzano wasn’t sure; it was difficult to track her erratic cycles at home. The specialist asked no follow-up questions. “It’s your weight,” she said.

The doctor, Balzano was convinced, had reduced her to a single characteristic. “I was like, ‘Wait, wait, wait, there might be something else wrong,’” she recalls. “My mom isn’t morbidly obese, but she only had one pregnancy, and she was never on birth control. Couldn’t there be something else going on here?” Nick was furious. “I know plenty of larger women who have been pregnant without any problems,” he says. “This didn’t make any sense.” But they both say the doctor, who declined my interview request on the basis of patient confidentiality, was adamant. “I would never give you I.V.F.,” they recall her saying. “You’re too fat. Have more sex and lose the weight.”

Although Balzano didn’t know it when she made the appointment, the clinic that would have performed the procedure had a policy against providing I.V.F. to patients with a body mass index above 45; Gina’s was 51.2. In that decision, it followed much of the fertility industry, including half of the 20 largest clinics in the United States, according to FertilityIQ, an online clearinghouse of information on fertility providers nationwide. At some clinics, the cutoff for treatment is a B.M.I. of 50, often classified as “extreme” or “severe” obesity (roughly 300 pounds for a 5-foot-5 woman). At others, it’s much lower. Chelsea Ritchie, now the mother of twins in Ham Lake, Minn., got a call from a nurse the day before her initial appointment with a fertility doctor in 2011. “She said, ‘The doctor only sees patients with a B.M.I. under 30, so you’ll need to lose 22 pounds.’” Ritchie recalls. (The doctor told me that his cutoff for seeing patients is actually a B.M.I. of 35, though he won’t do I.V.F. unless they’re under 30. Ritchie subsequently conceived her twins after going to a different clinic.) B.M.I. doesn’t factor in gender, age or muscle mass, all of which influence body composition and health. But the World Health Organization adopted the B.M.I. scale as an official classification in 1995, and it has since become medicine’s standard metric for categorizing patients by weight. A B.M.I. of 30 or above is classified as “obese,” the word still used by doctors, researchers and the media, although surveys of larger patients show that most consider it derogatory; many now reclaim the once-offensive “fat.”

The belief that a high body weight causes infertility, and its corollary — that weight loss is necessary to resolve infertility — underpin almost every interaction a heavy woman will have with the reproductive health care industry. Yet the specialty’s two governing organizations, the American Society for Reproductive Medicine and the Society for Assisted Reproductive Technology, have not established any guidelines on whether treatment should be declined on the basis of weight. And as the percentage of American women categorized as obese has grown to 41.1 percent in 2016 from 25.4 in 1994, some doctors are pushing back against the notion that weight loss should ever be, in effect, a prerequisite for motherhood. “I think we’ve been overexaggerating the benefits of preconception weight loss,” says Dr. Richard S. Legro, a professor of public health services and chair of obstetrics and gynecology at Penn State University. In fact, a fixation on weight
may be leading health care astray. “Many providers see a larger woman and say things like, ‘Don’t eat cheeseburgers,’ even though she’s a vegetarian,” says Sharon Bernecki DeJoy, associate professor of health at West Chester University who studies maternity care in the United States. “There’s a lack of recognition of evidence that shows you can be healthy and still have a, quote-unquote, unhealthy B.M.I.” And a lack of recognition that when a heavy person does get sick, it might not be because of weight.

When I knew Balzano back in high school, she was a quirky, glitter-covered theater kid who wrote plays about fairy tales. We lost touch for years after graduation, until our early 30s, when we began to run into each other once a year at the New York State Sheep and Wool Festival. The first few times I saw her, she was heavy, just as she had been when we were kids. Then suddenly, in 2016, she was much less so. A few weeks later I learned why. “I cut off 70 percent of my stomach so I could have the chance to be treated for infertility,” she wrote in an email.

At the festival, Balzano stocked up on yarn to make tiny sweaters and hats for friends’ babies. During our interviews, we often veered off course while she sorted through my struggles with potty training or tantrum management. Even though I was already a mother and she wasn’t, Balzano had more experience in navigating such milestones through her work as a special-ed teacher. In so many ways, Balzano had been maternal as long as I’ve known her. But motherhood is both an emotional state and an embodied one, and a doctor had said Balzano’s body wasn’t right for the job. In this respect, B.M.I. cutoffs become more than tools to promote patient health. They also become a way in which doctors might be settling the question: Which women’s bodies are worthy of carrying a child?

In 1952, a pair of Boston physicians published a study in The New England Journal of Medicine titled “The Relation of Obesity to Menstrual Disturbances.” The authors surveyed 100 women between the ages of 16 and 40 who had been given diagnoses of menstrual disorders and compared their weights with a control group with no reproductive health issues. Forty-three percent of the patients with menstrual disorders weighed 20 percent or more than their “ideal weight,” compared with just 13 percent of the control subjects. Their findings, the authors concluded, gave “factual proof to the clinical impression of the association of obesity and menstrual disturbances.”

Ever since, the idea that a high body mass contributes to infertility has been an accepted premise. “There’s no question — it’s been validated in a number of studies,” says Alan Penzias, a former surgical director for Boston I.V.F., a national chain of fertility clinics, and an associate professor of reproductive biology at Harvard Medical School. In 2007, researchers combed through data collected on 7,327 pregnancies from 1959 to 1965 and found that it took heavier women a median of one to two months longer to conceive, compared with women with B.M.I.s in the “normal weight” range. A 2015 study of 1,602 Italian women undergoing I.V.F. found that the bigger women were just as likely to get pregnant, but were more likely to miscarry. All in all, the research shows a correlating decline in successful pregnancy rates as B.M.I. rises.

Penzias’s clinic employs a tiered cutoff system and begins counseling patients about the importance of weight loss when their B.M.I. is 30, though it will still treat women whose B.M.I.s are higher, up to 45. Doctors say prescribing diet and exercise seems to be a logical place
to start before moving up the treatment ladder to expensive drugs, blood work, imaging tests and, if a patient’s case warrants I.V.F., at least one minor operation. And whatever stalls ovulation, losing weight often appears to restart it. This was documented by a 1995 study published in the journal Human Reproduction, in which 13 overweight women who were not ovulating were assigned to a weight-loss program. Six months later, they had lost an average of 13.8 pounds, and all but one of them had resumed ovulating. Eleven became pregnant.

To critics of B.M.I. exclusions, the potential benefits of weight loss are outstripped by how difficult it is for patients to sustain. Studies on dieting show that people lose, at best, 5 to 10 percent of their body weight, and most will regain that within five years. “If a patient starts with a B.M.I. of 50 and now she’s at 45, does that make much difference?” Legro asks. In the meanwhile, he points out, the patient has lost crucial time. In 2017, when Swedish researchers put 160 high-weight women on a liquid diet for 12 weeks before starting I.V.F., resulting in a median loss of 20 pounds, they were no more likely to conceive than a control group.

Some aspects of fertility treatment can be more complicated for larger patients. Retrieving eggs for I.V.F. requires that a patient be sedated while a doctor uses an ultrasound probe to identify and extract eggs. “With an obese patient, I sometimes have to go in through her abdomen instead of her vagina, and I might not be able to retrieve as many eggs,” says Rachel Ashby, a reproductive endocrinologist at Brigham and Women’s Hospital in Boston. This lowers the patient’s odds of success.

But to Linda Bacon, an associate nutritionist at the University of California, Davis, and author of the book “Health at Every Size,” trying to assess the odds is beside the point, because doctors’ jobs are to treat the patient in front of them. “Even if it is causative (and it may be), people still deserve the right to good health care,” she emailed me to say. “Health care needs to take care of our lived bodies, regardless of size.”

Balzano believes she would have been annoyed, but far less devastated, if the doctor she saw had explained that their clinic wasn’t set up to handle her case. “That would have felt kinder and more ethical, but the implication was, ‘It’s irresponsible of you to want to have a baby at this size,’” she says. Jen McLellan, an activist and childbirth educator who writes a blog called Plus Size Birth, gets similar stories from her 172,000 Facebook followers: “I have heard from women of size who have been told to abort their babies.”

This is where the conversation about risk and responsibility turns. It’s no longer about what a woman is willing to inflict on herself — it’s about whether she might jeopardize her not-yet-conceived offspring. “We police women over their fitness to become a mother,” DeJoy says. “‘Are you drinking, are you smoking, do you have enough money and a partner?’ And if you’re a larger woman, it’s: ‘You don’t know how to eat and exercise. You’ll raise that kid to be fat.’”

So just how dangerous is it for a larger woman to have a baby? “The majority of the obstetricians we work with have said, ‘We support you standing up to this,’” says Dr. Bill Meyer, a founder of Carolina Conceptions, a fertility clinic in Raleigh, N.C. His clinic does not perform I.V.F. on patients with B.M.I.s above 37.5, and it does not prescribe fertility-stimulating medications to patients above 40. He points to how rates of prenatal conditions like gestational diabetes and pre-eclampsia, as well as miscarriages and stillbirths, all increase as a patient’s
B.M.I. climbs. Larger patients are at greater risk for airway obstruction and more likely to require intubation. “This has nothing to do with the fertility side,” Penzias says. “If they developed a complication under anesthesia, we’d have to transport them to a hospital.” In total, large women undergoing in vitro fertilization are 10 percent less likely to carry a pregnancy to full-term than women with lower B.M.I.s, according to a 2012 analysis of 27 studies.

“You can try to explain as much as possible to patients,” Meyer says. “But sometimes you say, ‘This is the best I can do with informed consent, and I’m just going to have to put my foot down.’”

“Informed consent” is a process doctors use to educate their patients about the potential risks and benefits of treatments so that patients can make reasoned decisions about their care. It’s supposed to foster a partnership between patient and doctor, though doctors are allowed to initiate treatment without informed consent in an emergency, according to the American Medical Association’s code of ethics. The code also states that the doctor’s obligation to respect patient autonomy “does not mean that patients should receive specific interventions simply because they (or their surrogates) request them.” The A.M.A. then lists situations where a doctor is allowed to decline treatment without informed consent in an emergency, according to data published in 2017 in the journal Patient Education and Counseling.

All that can be said with any confidence, according to Legro, at Penn State, is that “there is no B.M.I. cut-point above which it is absolutely unsafe to have a pregnancy.” And weight loss does not ensure a safer pregnancy. When Scandinavian researchers linked data on bariatric surgery patients with infant health outcomes, they found that women who went through such procedures were
more likely to have preterm deliveries and babies who were small for their gestational age than mothers of any weight who had not undergone the surgery. “Patients are told to lose weight to have a healthy baby,” Legro says. “But it’s possible that by doing so, you may be at higher risk for complications than you were before.”

One day when Balzano was 19, she walked out of a gas station and a man in a passing car yelled, “Fat bastard!” “That was the moment when I realized my body was this problem for the entire world,” she recalls. Studies dating back to the 1960s have shown that when children are presented with pictures of other kids with various body types, they rate the fat body as the one they like the least. In 2013, Yale University researchers asked 74 study participants to read a published news article about Canadian physicians who wanted to deny fertility treatments to women with obese B.M.I.s. One-third of the study subjects read the article alongside an image of a large couple eating junk food; the rest saw the same couple sitting on a bench holding hands or no accompanying image. When researchers surveyed the readers, those who had seen the junk food were more likely than the rest to support the doctors’ decision to deny fertility treatment to such patients.

Good health is often equated with being a disciplined person, a responsible citizen, a worthier mother. And stereotypes — like the assumption that all fat people are gluttonous and willfully large — can shape our understanding of a person’s health and morality. “We all have cultural biases, and health care providers are people, too,” DeJoy says. Studies have indicated that doctors across all specialties are more likely to consider an overweight patient uncooperative, less compliant and even less intelligent than a thinner counterpart. An Australian study on prenatal health care found that doctors expressed less sympathy and approval for their larger pregnant patients. “Until I found my doula and midwife, I had never had a medical professional touch my body with compassion,” says McLellan, who identifies as a fat woman and had a healthy pregnancy. “That feels normal to a person of size.”

Weight-science researchers are aware of how that lack of compassion can have health consequences. The kind of stigma that women like McLellan and Balzano encounter throughout their lives puts fat people at higher risk for depression, anxiety and suicidal thoughts. They also have higher blood pressure and higher levels of stress hormones. And many researchers documenting these risks control for B.M.I. when they collect their data. “This tells us that it’s stigma, rather than one’s weight per se, that contributes to these adverse health outcomes,” says Rebecca Puhl, an author of the 2013 Yale study and the deputy director for the Rudd Center for Food Policy and Obesity at the University of Connecticut.

“This evidence also challenges the notion that stigma will motivate people to lose weight.”

Balzano’s husband, Nick, was eager to get a second opinion right away, but it was two years before she could bring herself to see another doctor. “I couldn’t take another conversation like that,” she says. “I felt like this waste of a person.” In private, she sobbed whenever friends announced a pregnancy. Then one friend, who was also heavy, told Balzano that she’d had a good experience at Boston I.V.F. So they made an appointment. When they arrived, a concierge greeted the couple as soon as they walked in. Balzano responded by starting to cry. The place felt too slick and fancy. She was sure she would once again be deemed unfit.

The doctor listened to Balzano’s story
and said she understood how emotional the situation was. But she did want Balzano to lose weight. In the meantime, she was willing to prescribe letrozole, a medication used to promote ovulation, or, if that failed, a course of intrauterine insemination. I.U.I. is a low-risk procedure done without sedation in the doctor’s office; sperm is placed inside the patient’s uterus during ovulation in order to facilitate fertilization. “But it didn’t seem like she was all that interested in that,” Nick says. “The impression I got was that nobody thinks anything besides I.V.F. will work, and they wouldn’t give Gina I.V.F.” The doctor told me she recalls that she was “certainly willing to go ahead with medication and insemination,” but says she counseled Balzano to see a maternal fetal medicine specialist to discuss the potential impact of her weight on a pregnancy. Balzano declined the letrozole: “Essentially, she was saying the same thing as the first doctor — that nothing would change until I fixed my weight.”

Even when they do receive fertility treatment, women in larger bodies may encounter stigma in how a reproductive endocrinologist approaches their care. Stephanie Robben, 44, and the mother of twin boys in St. Louis, says her doctor didn’t mention her weight — then 247 pounds — until the first I.V.F. cycle failed. Then he outlined a daily plan for her: Drink a gallon of water, eat fewer than 900 calories and exercise for an hour. If Robben followed these directions correctly, the doctor expected her to lose 50 pounds in a month, much more than the monthly rate of four to eight pounds considered safe by major health organizations. Such extreme dieting can lead to dangerous electrolyte imbalances, dehydration — and irregular menstruation. “Rapid weight loss achieved by crash diets or excessive exercise is detrimental to reproductive outcomes during fertility treatments,” British researchers concluded in a 2010 issue of the Journal of Human Reproductive Sciences.

“By the end of the second day, I couldn’t even formulate a sentence,” Robben says. “All I could think about was a piece of chicken breast in my fridge.” By the end of the month, she had lost 20 pounds. The next round of I.V.F. failed as well. (Her doctor declined to comment for this article.) Robben later conceived her twins after seeing a different doctor, and without losing additional weight.

Meyer, of Carolina Conceptions, objects to the idea that weight stigma, not health concern, motivates clinics to require weight loss. “There are tears in these conversations,” he acknowledges. “But most of the time, I feel pretty good after sitting down with these patients. I think we almost overcompensate so we’re not judged as being biased toward weight.” When Meyer’s clinic turns away a patient based on B.M.I., it offers a referral to a local weight-loss program. He estimates that around 60 percent of those women follow through. “The patients who then come back to us [for treatment] are very thankful that they’ve made those changes,” he says. “Or their husband will say, ‘Thank you for talking to her about that.’”

Meyer admits that he doesn’t know what happens to the patients who don’t return. But those are the patients whom Rachel Ashby, at Boston’s Brigham and Women’s Hospital, worries about most. “There probably is a subset of women out there who stop seeking treatment because they are aware that they may feel marginalized in the doctor’s office,” she says. “They feel this sense of ‘I can’t pursue this anymore,’ and just live quietly with infertility.”

Balzano didn’t want to live quietly anymore. After the appointment, she says, “I reconciled myself to having weight-loss surgery pretty much that moment.” Bariatric surgery patients
can lose 25 to 35 percent of their original weight, and keep it off longer than dieters do — making it the most enduring form of weight loss available. But many patients develop vitamin deficiencies because of their limited diets. And female patients are told it’s not safe to become pregnant for at least one year. The operation would cause Balzano to lose yet more time.

To Balzano’s doctors, this decision was a rational attempt to take control of her health and fertility. The couple see it as her required sacrifice. “We couldn’t achieve this goal because people didn’t like the way she looked,” says Nick, who was anxious about the surgery’s risks. Balzano recalls: “I was at the point where I would cut off a limb to have a baby. So fine, why not my stomach?” Balzano had her operation in December 2015. When we talked a year later, she told me how she had survived the first months consuming only liquids, and then, tiny portions of fat-free refried beans. Her B.M.I. was down to 32.1. Balzano got Ashby’s name from her bariatric surgeon and made an appointment for January 2017.

Balzano was now 37. However many high-quality eggs she’d had when she began trying to conceive at 30, there were thousands fewer now. “We have to get started,” Ashby told Balzano. “In fact, I would have begun treatment when you were at your highest weight.” Nick’s eyes bulged. “So we spent a ton of money and a ton of pain and we could have done this five years ago?” he asked. When we spoke the next day, Balzano was trying to remain calm about the revelation. “Look, it’s done; I’m in a good place,” she said of her surgery. “But I can understand why someone in my position might be incandescent with rage right now.”

Ashby told me that she would have treated Balzano at 340 pounds because she was in good health then. She doesn’t think weight was the primary cause of Balzano’s infertility, because the couple remained unable to conceive even after her surgical weight loss. “Patients often ask me, ‘If I were a normal B.M.I., would I be fertile?’ Often, that answer is no,” Ashby says. “And absent some grave risk to a patient, it’s paternalistic to say to a 35-year-old woman, ‘Go lose a hundred pounds.’”

Massachusetts health care law requires couples to try three rounds of intrauterine insemination before insurance will cover the cost of I.V.F. The first attempt failed, as everyone expected, but in November 2017, I heard from Balzano: “Just got a positive pregnancy test.” The second round of I.U.I. had worked. Logan Anthony was born on June 5, 2018, five weeks early but healthy. “I’m enjoying all the little moments daily, even the diapers,” Balzano told me, shortly after Logan turned 6 months old. “It’s still sinking in that I’m someone’s mom.”
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ENERGY DRINKS HAVE BECOME WILDLY POPULAR WITH TEENS. HERE’S WHY IT’S A PUBLIC HEALTH CONCERN

BY SARA TALPOS / UNDARK

Earlier this year, a half-dozen students from City Hill Middle School, in Naugatuck, Connecticut, traveled with their science teacher Katrina Spina to the state capital to testify in support of a bill that would ban sales of energy drinks to children under the age of 16. Having devoted three months to a chemistry unit studying the ingredients in and potential health impacts of common energy drinks — with brand names like Red Bull, Monster Energy, and Rockstar — the students came to a sobering conclusion: “Energy drinks can be fatal to everyone, but especially to adolescents,” 7th-grader Luke Deitelbaum told state legislators. “Even though this is true, most energy drink companies continue to market these drinks specifically toward teens.”

A 2018 report found that more than 40 percent of American teens in a survey had consumed an energy drink within the past three months. Another survey found that 28 percent of adolescents in the European Union had consumed these sorts of beverages in the past three days.

This popularity is in marked contrast to the recommendations of groups like the American Academy of Pediatrics and the American College of Sports Medicine, who say youth should forgo these products entirely. These recommendations are based on concerns about health problems that, although rare, can occur after consumption, including seizures, delirium, rapid heart rate, stroke, and even sudden death. A U.S. government report found that from 2007 to 2011, the number of emergency department visits involving energy drinks more than doubled, to nearly 21,000.

Of these, approximately 1,500 were children aged 12 to 17, although the number of visits from this age group increased only slightly over the four years.

For their part, energy drink manufacturers argue that they are being unfairly targeted. At the Connecticut hearing, the head of public affairs for Red Bull North America, Joseph Luppino, maintained that there is no scientific justification to regulate energy drinks differently than other caffeine-containing beverages such as soda, coffee, and tea — particularly when some coffeehouses serve coffee with a caffeine content exceeding that of a can of Red Bull. “Age-gating is an incredibly powerful tool,” Luppino said, and should be reserved for “inherently dangerous products” like nicotine.
The showdown in Connecticut, which pitted the City Hill students against a growing $55 billion a year global industry, was the latest in an ongoing debate about the safety and regulation of energy drinks. In recent years, countries such as the United Kingdom and Norway have considered banning sales to young people, while Lithuania and Latvia have active bans in place. In the U.S., along with Connecticut, state legislators in Maryland, Illinois, and Indiana have introduced bills, though none have been signed into law. A South Carolina bill to ban sales to kids under 18 — and to fine those caught selling them to minors — advanced through the legislature in April, and is now pending before the state’s full medical affairs committee. It is supported by the parents of a 16-year-old who died from a caffeine-induced cardiac event after consuming a coffee, a soda, and an energy drink within a period of two hours.

As the regulatory status of energy drinks continues to be debated, a growing number of consumers and public health advocates are asking why and how a product loaded with caffeine and other stimulants became so popular among young people. The reasons are a mix of lax regulation, the use of caffeine as a sports performance enhancer among adults, and a bit of scientific uncertainty.

According to sports cardiologist John Higgins, a professor at McGovern Medical School at UTHealth in Houston, there is also another factor: “very, very intelligent advertising.”

Historically, government agencies such as the U.S. Food and Drug Administration have struggled to regulate beverages with added caffeine. Though it offers some guidance, the FDA allows manufacturers of liquid products to decide on their own whether to market their products as dietary supplements, or as conventional foods and beverages, which carry differing regulatory requirements. All three major energy drink makers now have most of their products regulated as foods, rather than dietary supplements — though that wasn’t always the case.

Researchers from the Johns Hopkins School of Medicine, in a review published in the journal Drug and Alcohol Dependence, note that lack of consistency is partly due to our long love affair with drinks in which caffeine is naturally occurring, including coffee and tea. In 1980, citing health concerns, the FDA proposed to eliminate caffeine from soft drinks, which are regulated as foods. The manufacturers, however, claimed the caffeine was a flavor enhancer. The FDA approved caffeine, but limited the maximum content of cola-type soft drinks to .02 percent, or roughly 71 milligrams per 12-ounce serving.

“If caffeine had not been accepted as a flavor enhancer, but had been regarded as a psychoactive ingredient,” write the Johns Hopkins researchers, “soft drinks might have been regulated by the FDA as drugs” — which are subject to additional regulations.

U.S.

Not All Candy is Created Equal — At Least for Tax Purposes

When energy drinks first appeared on the American market in the late 1990s and early 2000s, some manufacturers claimed the products were neither drugs nor conventional foods, but dietary supplements. Drugs with caffeine require warning labels, but dietary supplements don’t. “It is a striking inconsistency that, in the U.S. an [over-the-counter] stimulant medication containing 100 mg of caffeine per tablet (e.g. NoDoz) must include [a series of] warnings,” write the Johns Hopkins researchers,
“whereas a 500 mg energy drink can be marketed with no such warnings and no information on caffeine dose amount in the product.”

As early as 2009, sports and medical organizations began issuing position statements discouraging energy drink consumption by young people. In 2011, the American Academy of Pediatrics concluded that energy drinks “are not appropriate for children and adolescents, and should never be consumed.” Further, the group warned that adolescents might mistakenly use energy drinks, rather than sports drinks like Gatorade, for rehydration during physical activity. “Advertisements that target young people are contributing to the confusion,” wrote the authors.

Two years later, in 2013, questions about safety and marketing came to a head in the halls of Congress. Three Democratic senators launched an investigation into the marketing practices of energy drink companies. They found that adolescents between the ages of 13 and 17 are frequent targets of energy drink marketing, and stated in a written report that “this population is also at risk for the detrimental impacts of energy drink consumption.” The report also noted a range of claims not evaluated or substantiated by the FDA. For example, the makers of AMP Energy marketed the drinks as helping to “energize and hydrate the body,” while advertisements for Red Bull promised “increased concentration and reaction speed.”

(As it happens, a few months before the senate hearing, Monster Beverage Corporation and Rockstar Inc. announced their intention to follow in the footsteps of Red Bull by declaring their products to be foods, rather than dietary supplements.)

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Energy drink companies had been pioneers in using social media to market their products, said Harris. At the time of her study, Red Bull and Monster Energy were the fifth and twelfth most popular brands on Facebook — a platform that was, at the time, particularly popular among college students and adolescents. Further, said Harris, “energy drink brands often promote teen athletes and musicians and sponsor local events, where they provide free samples, including to minors.” The marketing is effective, she noted. Sales of most other beverage categories were declining, but energy drink sales had increased by 19 percent the previous year, reaching $8 billion in 2012.

The energy beverage industry vigorously defended its products and marketing practices. In his congressional statement, Rodney Sacks, CEO of Monster Beverage Corporation, noted that a 16-ounce can of Monster Energy contains 160 mg of caffeine. In contrast, the equivalent amount of Starbucks coffee contains 330 mg — more than twice as much. Further, Monster cans include a label recommending against consumption by children. (According to guidelines put forth by the American Beverage Association, a trade group, energy drinks should not be marketed to children under 12, and other leading brands such as Red Bull and Rockstar carry similar labels recommending against consumption by children.)

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“Caffeine is the most studied ergogenic aid on the planet,” says Fedoruk, and its use is widespread among elite athletes. Research has even produced recommended guidelines for ingestion prior to exercise. But these guidelines were developed for adults. Young people who try to follow them could quickly surpass the American Academy of Pediatrics’ guidelines for adolescents: no more than 100 mg of caffeine per day, or roughly the amount in a typical cup of coffee. Further, because energy drinks are manufactured in adult serving sizes, says Fedoruk, it’s easy for a child to get too much. “Depending on the product you choose, you could definitely be dosing your young child or youth athlete in doses that far exceed what may be safe for their body weight and size.”

When it comes to youth athletes, “our experts recommend both water and sports drinks as the best options for hydration,” writes Danielle Eurich, a USADA spokesperson. Athletes exercising less than an hour probably don’t even need sports drinks, she adds. “Water would be best.”

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Higgins suspects that the combination of ingredients — the caffeine and other stimulants such as guarana, taurine,
L-carnitine, along with added vitamins and minerals — interferes with the endothelium, a thin layer of cells that control dilation. But he can’t say for certain because there hasn’t been enough research. Higgins’ own study was preliminary and lacked a control group. Further, a recent review by a group of Harvard researchers noted considerable limitations to the existing energy drink literature. Most studies, the authors found, used small sample sizes or employed a cross-sectional design, which isn’t able to determine causation. Large longitudinal studies, meanwhile, require time and money.

Higgins says the main reason there is no evidence of safety is that energy drinks are not classified by most countries as drugs. “They are classified as supplements, additives, or whatever.” Until more data are available, Higgins’ opinion is that energy drinks should be avoided before, during, and after exercise. Anyone under 18 should avoid them entirely, he says. This recommendation has been endorsed by the American College of Sports Medicine.

Yet at the Connecticut hearing, Red Bull’s Joseph Luppino insisted that there is ample evidence of safety. He referenced the European Food Safety Authority, which conducts food-chain risk assessments for the European Union: “They have unequivocally concluded there are no synergistic effects between the various ingredients that are contained in energy drinks.”

When asked for a comment, the European agency pointed to its 2015 report, and a spokesperson explained the findings: In general, the combination of substances typically found in energy drinks “would not affect the safety of single doses of caffeine up to 200 mg.” Individuals who might drink a 16-oz can of Rockstar, or a 24-oz can of Monster containing 240 mg of caffeine plus other stimulants were not considered by the analysis. The E.U. agency spokesperson also issued a caveat: There wasn’t enough data to determine whether other common energy drink ingredients like guarana and taurine influence the acute effects of caffeine on blood pressure.

Monster and Rockstar did not respond to repeated requests for comment. When asked about the discrepancy between Luppino’s characterization of the European report and the agency’s own characterization of its findings, Erin Mand, a spokesperson for Red Bull, pointed to particular passages in the report that suggest the safety of particular ingredient combinations up to 200 mg of caffeine. She additionally noted that “its single-serving products fall under 200 mg of caffeine.”

The American Beverage Association also did not respond to specific interview questions, but did provide this statement: “Energy drinks have been enjoyed by millions of people around the world for more than 30 years, and are recognized by government health agencies worldwide as safe for consumption. The amount of caffeine in energy drinks is typically half the amount found in a coffeehouse coffee and is no different from the caffeine found in other foods and beverages. Further, America’s mainstream energy drink companies have taken voluntary steps to ensure their products are not marketed to children.”

In the spring of 2017, Gary Watts, the coroner for South Carolina’s Richland County, released the autopsy results for Davis Cripe, the teenager whose death spurred the South Carolina bill to ban sales of energy drinks to minors. The cause of death: a caffeine-induced cardiac event causing a probable arrhythmia. “Typically you don’t see the results of an arrhythmia in an actual
autopsy because there’s no real damage to the heart,” Watts said.

After Cripe collapsed at school, a staff member who had previously worked as a nurse in a cardiac unit diagnosed a cardiac arrhythmia.

“Who’s to say that this hasn’t happened before?” says Watts, whose office has performed autopsies on other young adults who died of sudden death. “It probably has — it’s just that we’ve not been able to document [the cause] with someone on the scene at the time who says, ‘Okay, this is an arrhythmia.’” Watts believes there are too many uncertainties about energy drinks to say that they are safe for adolescents. “I’m not trying to get rid of energy drinks,” he said. “I know a lot of people use them. But I do think that the age is a concern that everybody needs to be really serious about.”

As for the Connecticut bill, it has not moved out of committee, but in mid-May, the City Hill Middle School students and their teacher returned to the state capital to lobby lawmakers. They shared informational brochures created by the students, as well as informal results from a survey of students and parents, indicating widespread support for their bill among the latter. In the meantime, the students say, their siblings and peers continue to consume energy drinks — on soccer fields, in dugouts, in front of video game consoles.

“It’s so interesting,” City Hill student Emily Fine said of energy drink makers and their products, “how they still put them on the market.”
Earlier this year, a half-dozen students from City Hill Middle School, in Naugatuck, Connecticut, traveled with their science teacher, Katrina Spina, to the state capital to testify in support of a bill that would ban sales of energy drinks to children under the age of 16. Having devoted three months to a chemistry unit studying the ingredients in and potential health impacts of common energy drinks—with brand names like Red Bull, Monster Energy, and Rockstar—the students came to a sobering conclusion: “Energy drinks can be fatal to everyone, but especially to adolescents,” a seventh grader, Luke Deitelbaum, told state legislators. “Even though this is true, most energy-drink companies continue to market these drinks specifically toward teens.”

A 2018 report found that more than 40 percent of American teens surveyed had consumed an energy drink within the past three months. Another survey found that 28 percent of adolescents in the European Union had consumed these sorts of beverages in the past three days. This popularity is in marked contrast to the recommendations of groups like the American Academy of Pediatrics and the American College of Sports Medicine, who say youth should forgo these products entirely. These recommendations are based on concerns about health problems that, although rare, can occur after consumption, including seizures, delirium, rapid heart rate, stroke, and even sudden death. A U.S. government report found that from 2007 to 2011, the number of emergency-department visits involving energy drinks more than doubled, to nearly 21,000.

Of these, approximately 1,500 were children ages 12 to 17, although the number of visits from this age group increased only slightly over the four years.

For their part, energy-drink manufacturers argue that they are being unfairly targeted. At the Connecticut hearing, the head of public affairs for Red Bull North America, Joseph Luppino, maintained that there is no scientific justification to regulate energy drinks differently than other caffeine-containing beverages such as soda, coffee, and tea—particularly when some coffeehouses serve coffee with a
caffeine content exceeding that of a can of Red Bull. “Age-gating is an incredibly powerful tool,” Luppino said, and should be reserved for “inherently dangerous products” like nicotine.

The showdown in Connecticut, which pitted the City Hill students against a growing $55-billion-a-year global industry, was the latest in an ongoing debate about the safety and regulation of energy drinks. In recent years, countries such as the United Kingdom and Norway have considered banning sales to young people, while Lithuania and Latvia have active bans in place. In the United States, along with Connecticut, state legislators in Maryland, Illinois, and Indiana have introduced bills, though none have been signed into law. A South Carolina bill to ban sales to kids under 18—and to fine those caught selling the drinks to minors—advanced through the legislature in April, and is now pending before the state’s full medical-affairs committee. It is supported by the parents of a 16-year-old who died from a caffeine-induced cardiac event after consuming a coffee, a soda, and an energy drink within a period of two hours.

As the regulatory status of energy drinks continues to be debated, a growing number of consumers and public-health advocates are asking why and how a product loaded with caffeine and other stimulants became so popular among young people. The reasons are a mix of lax regulation, the use of caffeine as a sports-performance enhancer among adults, and a bit of scientific uncertainty.

According to the sports cardiologist John Higgins, a professor at McGovern Medical School at UTHealth in Houston, there is also another factor: “very, very intelligent advertising.”

Historically, government agencies such as the U.S. Food and Drug Administration have struggled to regulate beverages with added caffeine. Though it offers some guidance, the FDA allows manufacturers of liquid products to decide on their own whether to market their products as dietary supplements or as conventional foods and beverages, which carry differing regulatory requirements. All three major energy-drink makers now have most of their products regulated as foods rather than dietary supplements—though that wasn’t always the case.

Researchers from the Johns Hopkins School of Medicine, in a 2008 review published in the journal Drug and Alcohol Dependence, note that that lack of consistency is partly due to our long love affair with drinks in which caffeine is naturally occurring, including coffee and tea. In 1980, citing health concerns, the FDA proposed to eliminate caffeine from soft drinks, which are regulated as foods. The manufacturers, however, claimed the caffeine was a flavor enhancer. The FDA approved caffeine, but limited the maximum content of cola-type soft drinks to .02 percent, or roughly 71 milligrams per 12-ounce serving.

“If caffeine had not been accepted as a flavor enhancer, but had been regarded as a psychoactive ingredient,” write the Johns Hopkins researchers, “soft drinks might have been regulated by the FDA as drugs”—which are subject to additional regulations.

When energy drinks first appeared on the American market in the late 1990s and early 2000s, some manufacturers claimed the products were neither drugs nor conventional foods, but dietary supplements. Drugs with caffeine require warning labels, but dietary supplements don’t. “It is a striking inconsistency that, in the U.S. an [over-the-counter] stimulant medication containing 100 mg of caffeine per tablet
(e.g. NoDoz) must include [a series of] warnings,” write the Johns Hopkins researchers, “whereas a 500 mg energy drink can be marketed with no such warnings and no information on caffeine dose amount in the product.”

As early as 2009, sports and medical organizations began issuing position statements discouraging energy-drink consumption by young people. In 2011, the American Academy of Pediatrics concluded that energy drinks “are not appropriate for children and adolescents, and should never be consumed.” Further, the group warned that adolescents might mistakenly use energy drinks, rather than sports drinks like Gatorade, for rehydration during physical activity. “Advertisements that target young people are contributing to the confusion,” wrote the authors.

Two years later, in 2013, questions about safety and marketing came to a head in the halls of Congress. Three Democratic senators launched an investigation into the marketing practices of energy-drink companies. They found that adolescents between the ages of 13 and 17 are frequent targets of energy-drink marketing, and stated in a written report that “this population is also at risk for the detrimental impacts of energy-drink consumption.” The report also noted a range of claims not evaluated or substantiated by the FDA. For example, the makers of AMP Energy marketed the drinks as helping to “energize and hydrate the body,” while advertisements for Red Bull promised “increased concentration and reaction speed.”

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“It’s so interesting,” a City Hill student, Emily Fine, said of energy-drink makers and their products, “how they still put them on the market.”

This post appears courtesy of Undark Magazine.
Eric O’Grey, who lives in Rockville, gave me some advice for sticking with the new healthy eating plan I’ve started. Go all in on a whole-food, plant-based diet. And get a dog. That’s what he’d done: changed his diet, adopted a dog from a shelter and begun walking the new companion.

He’d made the change in 2010, at age 51. At the time, he weighed 340 pounds. That’s considered morbidly obese for a man who stands 5-foot-10. “Tying my shoes would leave me out of breath,” he recalled.

A year after changing his eating habits and taking daily walks, his weight dropped to 175 pounds. He wrote a book, published in 2017, “Walking with Peety: The Dog Who Saved My Life.” Today, at age 60, he’s kept the weight off and works with the Washington-based Physicians Committee for Responsible Medicine, which advocates preventive medicine and eating a vegan diet.

On March 9, he’ll run in the Rock ‘n’ Roll Marathon in the District.

“You can do this,” O’Grey told me over lunch recently.

“Just change your habits and get a dog, just do it,” O’Grey said. “You can do it.”

I’d stopped eating animals and animal products last month. Including fish and dairy. The weight has started to come off, the blood pressure and cholesterol levels are going down. I do feel better.

But the bad-food industry is a formidable foe. Its marketing schemes make Big Tobacco look like amateurs. Burgers and fries on highway billboards. Buckets of chicken and biscuits on TV. Pop-up ads for hot dogs and sodas on my phone. Two-for-one pizza ads on my radio.

Even though I know that fast foods are not healthy and don’t even taste that good, the sight of crispy fried chicken or a sizzling burger in the mass media can still make my mouth water. The same could be true of fruits and vegetables. But I hardly ever see an ad for those.

From 2013 to 2017, TV junk-food marketing aimed at African Americans increased more than 50 percent, according to a report released last month from the University of Connecticut’s Rudd Center for Food Policy & Obesity. Black teenagers saw more than twice as many ads for unhealthy foods as white teens in 2017, the study found.
Obesity is a national epidemic. Polyunsaturated fats and carcinogenic meats don’t care about your race. They want to clog your arteries and corrode your vital organs. Heart disease and cancer are the top two killers in the country, for all groups. Unhealthy foods are contributing to more deaths than all the gunshot wounds, car crashes and drug overdoses combined.

But there’s no denying that some groups are targeted more than others.

“I told my doctor that I was only eating what everybody else was eating,” O’Grey recalled. “My doctor said that was the problem.”

Fast foods and microwaves, that’s what he relied on. I was the same way. I’d go to a fast-food drive-through late at night and find a line of cars virtually surrounding the place. I’d become disgusted seeing so many people hooked on junk food that there was no place in the line for me.

What most neighborhoods need is a gym and a health-food store. What you get are drive-through fast food, drugstores and dialysis clinics. The message is not subtle. The insidiousness is right in front of our eyes.

I hope those days are over for me — and everybody else at risk of suicide by food.

O’Grey was a reminder of where that kind of mindless eating can lead. The obstacles we face when the food can be delivered cooked and quick. And he’s also living proof that there is a healthier way.

Before switching his bad eating for good, O’Grey had been taking 15 different kinds of medication — for anxiety, hypertension and cholesterol. He was on 200 units of insulin a day for Type 2 diabetes along with medication to counter the side effects of all the other medicine. He had no friends, rarely left his apartment and slept 12 hours a day.

“I hadn’t dated in 15 years,” he said.

He used to eat once a day — two extra-large pizzas and a two-liter soda, more than 10,000 calories total — then fall into a food coma.

“One of the many doctors I’d seen told me that I should have bariatric surgery or else, in five years, start picking out a spot in a cemetery,” he said.

For O’Grey, an experience aboard an airline helped him make the change.

“As I was walking down the aisle of the aircraft, I saw the look on the people’s faces. It was a look that said, ‘Please, God, don’t let that fat man sit next to me.’ ” He squeezed into a center seat only to discover that the airplane had run out of seat-belt extensions. He couldn’t buckle up and the airplane could not take off until an extension could be found.

“Several people around me were saying things like, ‘He’s too fat,’ and ‘I’m going to miss my flight because this guy has no self-control.’ It was humiliating.”

He had already been scheduled for bariatric surgery but decided to give the plant-based diet a try and to get a dog — one last attempt before having part of his stomach removed. It worked.

In 2017, he got married. His wife, Jaye, had weighed 197 when they met. He became her nutrition coach, and in just over a year she was down to 115 pounds.

More proof that a whole-food, plant-based diet can make a tremendous difference in the quality of life. And fast.

“You have to wonder, why aren’t more
people eating this way?” O’Grey said.

From those initial walks around the block with Peety, he joined a running group. When Peety died in 2015, he took it hard, nearly went back to some old eating habits. But he stuck with the program and got another dog.

In addition to running marathons, he’ll be participating in the Ironman Maryland competition in September.

I was still new to all of this and just didn’t want to find myself at some drive-through window grabbing a burger and fries. I needed support.

O’Grey said that he, too, notices the TV commercials for fast foods but isn’t tempted by them. There are other ads that take the sizzle out.

“I’ve seen fast-food ads followed by ads for pharmaceutical products — medications for conditions caused by fast foods in some cases,” he told me.

“And those commercials are sometimes followed by ads for lawyers involved in class-action lawsuits against the pharmaceutical companies. It’s a circle of insanity. Why not just eat more fruits and vegetables?”

Maybe I’ll get a dog, too.

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**NBC NEWS**

**JUNK FOOD ADS DISPROPORTIONATELY TARGET BLACK AND HISPANIC KIDS, STUDY FINDS**

Researchers find a growing disparity between ads targeted to white teens and those aimed at minority youth.

*By Shamard Charles, M.D.*

A report released on Tuesday finds that junk food advertising continues to disproportionately target black and Hispanic youth, contributing to health disparities.

From 2013 to 2017, spending on TV advertising for restaurants, food and beverages
decreased by 4 percent overall, the researchers found, while spending for programs directed at black teens increased by 50 percent — from $217 million to $333 million — underlining the disparity in exposure to advertising between white and black youth.

The report also found that Hispanic children and teens viewed on average 2 more Spanish-language food ads, in addition to English-language TV ads in 2017.

“Food companies hardly ever market fruit and vegetables, water or healthy juices,” said Jennifer Harris, a lead author of the study and director of marketing initiatives for the Rudd Center for Food Policy and Obesity at the University of Connecticut. “The money put towards such advertisements is less than 3 percent for the general population and less than 1 percent to blacks and Hispanics.”

Researchers from the University of Connecticut, Drexel University and the University of Texas Health Science Center looked at 32 restaurants and food and beverage companies that spent over $100 million each on total TV advertising in 2017.

In total, the food companies spent $11 billion on advertising that year, with 80 percent spent on ads for fast food, candy, sugary drinks and unhealthy snacks.

McDonald’s, Subway, Wendy’s, and Taco Bell ranked at the top for targeted advertising spending on Spanish-language TV; and Taco Bell, Domino’s, Burger King, Wendy’s, and Arby’s ranked at the top in targeted advertising spending on Black-targeted TV, in part, due to higher total advertising budgets.

“At best, these advertising patterns imply that food companies view black consumers as interested in candy, sugary drinks, fast food and snacks with a lot of salt, fat or sugar, but not in healthier foods,” said Shiriki Kumanyika, a study co-author and chair of the Council on Black Health at Drexel.

“The marketing is so pervasive that it’s almost invisible,” Kumanyika told NBC News. “I’m not sure it’s really widely known in black communities that this amount of money is being used to promote unhealthy products. Some companies spend quite a bit of money to endear themselves to these communities that they don’t even give public health organizations a chance.”

Another factor that contributes to poor nutrition among some minorities is poverty. Studies that compare communities with similar poverty rates have found that black and Hispanic neighborhoods tend to have fewer large supermarkets and more small grocery stores than white neighborhoods do. These stores offer fewer of the healthy alternatives like whole-grain foods, dairy products and fresh fruits and vegetables that a supermarket would provide.

Further compounding this problem is the prevalence of food deserts — areas in which residents are hard-pressed to find affordable, healthy food.

The government defines a food desert as an area where 33 percent of a city’s residents live more than one mile from a supermarket and 20 percent earn salaries below the poverty line. Many residents of food deserts — which are disproportionately located in communities of color — do not have cars and lack access to public transportation, making it difficult to get to a grocery store.

The marketing is so pervasive that it’s almost invisible.

Fast food and unhealthy food options that are marketed as cheaper and more easily accessible in small stores become
more desirable. As a result, the obesity rates in these areas are generally higher, meaning life-threatening illnesses like diabetes and heart disease are on the rise.

Junk food — any food that is highly processed, high in calories and low in nutrients — is usually high in added sugars, salt and saturated or trans fats. Some evidence suggests that junk food is as addictive as alcohol and drugs, leading health policy activists to call for food justice.

“Food and beverage companies have to stop taking advantage of our kids,” Kumanyika said. “They inadvertently contribute to poor health in black communities by heavily promoting products linked to an increased risk of obesity, diabetes and high blood pressure.”

This article was published on January 15, 2019.

BLACK AND HISPANIC YOUTH ARE TARGETED WITH JUNK FOOD ADS, RESEARCH SHOWS

By Jessica Ravitz, CNN

Click over to TV programming that caters to black and Hispanic youth and the commercials almost exclusively push fast food, sugary drinks, bad-for-you snacks and candy, a new report shows.

Junk food comprised 86% of ad spending on black-targeted programming and 82% of spending on Spanish-language television in 2017, according to the study released Tuesday.

“These companies are not just targeting black and Hispanic kids with their advertising, but they’re targeting them with the worst products,” said lead author Jennifer Harris of University of Connecticut’s Rudd Center for Food Policy & Obesity.

The report by the Rudd Center, a research and policy group working to combat childhood obesity, the Council on Black Health at Drexel University and Salud America! at the University of Texas Health Science Center at San Antonio...
analyzed the targeted advertising efforts of 32 restaurants and food and beverage companies that spent in excess of $100 million to reach children and teens just in 2017.

The researchers also looked at exposure to ads and compared their findings to previous data collected in 2013.

What they found was a growing disparity between what white youth and minority youth saw.

For example, while food companies decreased their spending for TV advertising by 4% between 2013 and 2017, a fact mirrored on Spanish-language TV, they upped their spending for black-targeted programs by more than 50%, researchers said.

In 2013, black youth saw 70% more food-related ads than their white peers. By 2017, black children saw 86% more than white kids, and black teens saw 119% more than white teens, the study found.

And this happened against a backdrop of healthier food options gaining buzz, and when companies touted their corporate responsibility programs and commitment to helping solve America’s obesity problem, Harris said.

Those efforts were more about PR and didn’t translate into advertising budgets, she said, especially for black and Hispanic youth.

Only 3% of ad dollars went to promoting healthier food options overall. But black-targeted programming saw just 1% of that spending and Spanish-language TV saw little to none.

That means Hispanic youth watching Spanish-language television were pretty much left out when it came to ads for options like nuts and fruits, researchers said; instead, nearly 20% of ads they viewed were for candy.

“At best, these advertising patterns imply that food companies view Black consumers as interested in candy, sugary drinks, fast food, and snacks with a lot of salt, fat, or sugar, but not in healthier foods,” said Shiriki Kumanyika, one of the study’s authors and chair of the Council on Black Health, in a written statement.

“Not only are these companies missing out on a marketing opportunity,” she added, “but they are inadvertently contributing to poor health in Black communities by heavily promoting products linked to an increased risk of obesity, diabetes, and high blood pressure.”

Obesity rates for non-Hispanic blacks and Hispanic youth far outpace the rates for white and Asian youth, according to the US Centers for Disease Control and Prevention. Nearly 26% of Hispanic youth and 22% of black youth were deemed obese, versus 14% of whites and 11% of Asians. The worst off, though, were Hispanic boys at 28% and black girls at more than 25%.

By studying advertising data, researchers were able to determine which companies targeted which group. Five companies that stood out in reaching black youth included Kraft Heinz, General Mills, Hershey, PepsiCo and Yum! Brands (KFC, Taco Bell, Pizza Hut). Among the companies targeting Hispanic youth were Mars, Nestle, Yum! Brands, McDonald’s and General Mills.

CNN contacted most all of these companies for a reaction to the report. Only Hershey reached out with a response.

It is “not accurate” to say that Hershey
targets youth or any ethnic or racial group, insisted spokesman Jeff Beckman.

“There is a significant difference between ‘targeting’ and ‘reaching’ consumers,” he explained in an email. “With iconic brands that are loved across virtually all demographics (age, race, income), we buy our TV spots on the outlets and programs that reach the broadest cross section of the American adult population.”

Hershey is “committed to not marketing to children,” and makes its media buys “based on reaching adults and decision makers in households,” he said.

“Broad-based TV media is consumed by many consumers, so when you buy a spot to reach a broad range of adults, there will also be some percentage of youth who will see the spot as well,” he added. “But it is inaccurate to conflate reaching a certain group of consumers with specifically targeting them.”

Still, the report’s authors hope their study will help make food manufacturers think differently. They want these companies to target black and Hispanic youth less with unhealthy food ads and, instead, include these kids in initiatives to promote healthier habits.

“This report shows just how much the food and beverage industry values Hispanic consumers when it comes to encouraging them to buy unhealthy products,” said study co-author Amelie Ramirez, director of Salud America!, which advocates for health equity.

“If the industry really values these consumers, companies will take responsibility for advertising that encourages poor diet and related diseases,” she added in a written statement. “They can start by eliminating the marketing of unhealthy products to Hispanic youth and families.”
When given the option, students in school meal programs are more likely to choose fruit juice over more nutritious whole fruit or milk, a new study finds.

“This is a problem because compared to juice, milk and whole fruit are better sources of three nutrients of concern for adolescents -- calcium, vitamin D and fiber,” study co-author Marlene Schwartz said in a University of Connecticut news release.

Schwartz is director of the UConn Rudd Center for Food Policy and Obesity.

The researchers analyzed cafeteria register data from three low-income, Northeast high schools over one school year. When juice was available to students in the National School Lunch program, almost 10 percent fewer milks were chosen and about 7 percent less whole fruit.

The researchers also looked at a la carte sales of beverages, and found that 8 percent fewer bottles of water and 24 percent fewer bottles of 100 percent juice were sold when juice was offered.

“The potential nutritional impact of these substitutions is important to consider,” said lead author Rebecca Boehm.

“For instance, an 8-ounce serving of apple juice has no vitamin D, 285 fewer grams of calcium, and 116 fewer grams of potassium compared to an 8-ounce serving of 1 percent milk,” said Boehm, a postdoctoral fellow at UConn.

The American Academy of Pediatrics recommends that children aged 7 to 18 consume no more than 8 ounces of juice a day.

The National School Lunch program reaches over 30 million students. Juice is allowed only on certain days.

The study was published recently in the Journal of Nutrition Education and Behavior.
Nearly all TV food ads aimed at Hispanic and black children in the United States are for unhealthy products, a new report claims.

In 2017, black teens saw more than twice as many ads for unhealthy food products as white teens, researchers found.

“Food companies have introduced healthier products and established corporate responsibility programs to support health and wellness among their customers, but this study shows that they continue to spend 8 of 10 TV advertising dollars on fast food, candy, sugary drinks and unhealthy snacks, with even more advertising for these products targeted to black and Hispanic youth,” report lead author Jennifer Harris said in a University of Connecticut news release.

Harris is director of marketing initiatives at the university’s Rudd Center for Food Policy and Obesity.

In the report released Tuesday, researchers analyzed advertising by 32 major restaurant, food and beverage companies that spent at least $100 million or more on advertising to U.S. children and teens in 2017. They were part of the Children’s Food and Beverage Advertising Initiative, a voluntary program that sets standards for food advertising aimed at children younger than 12.

Fast food, candy, sugary drinks and unhealthy snacks accounted for 86 percent of food ad spending on black-targeted TV programming, and 82 percent of ad spending on Spanish-language TV, the researchers found.

Of the nearly $11 billion spent in total TV advertising in 2017, $1.1 billion was for advertising in black- and Spanish-language TV programming, according to the report.

It also found that food companies increased their black-targeted TV ad spending by more than 50 percent between 2013 and 2017, even though

**BLACK TEENS SEE TWICE THE JUNK FOOD ADS AS WHITE TEENS, STUDY SAYS**

“Not only are these companies missing out on a marketing opportunity, but they are inadvertently contributing to poor health in black communities,” said researcher Shiriki Kumanyika.

By HealthDay News
their total advertising spending on all TV programming fell by 4 percent.

At the same time, overall advertising for healthier products such as 100 percent juice, water, nuts and fruit accounted for only $195 million of all TV ad programming in 2017. That totaled just 3 percent of overall ad spending by the 32 companies.

But ads for healthier products accounted for just 1 percent of ads on black-targeted TV and did not appear at all on Spanish-language TV.

“At best, these advertising patterns imply that food companies view black consumers as interested in candy, sugary drinks, fast food and snacks with a lot of salt, fat or sugar, but not in healthier foods,” said study co-author Shiriki Kumanyika, chair of the Council on Black Health at Drexel University’s Dornsife School of Public Health in Philadelphia.

“Not only are these companies missing out on a marketing opportunity, but they are inadvertently contributing to poor health in black communities by heavily promoting products linked to an increased risk of obesity, diabetes and high blood pressure,” Kumanyika said.

Companies with the most brands aimed at all youth and at blacks and/or Hispanics of all ages included Mars (candy and gum brands), PepsiCo (snack and sugary drink brands), and Coca-Cola (sugary drink, diet soda, and drink mix brands), the report said.

Fast food restaurants represented approximately one-half (nearly $4 billion) of all food-related TV advertising in 2017.

The researchers called on food makers need to stop targeting black and Hispanic youth with ads for unhealthy foods. ●
UCONN RESEARCHERS: LGBT YOUTH VULNERABLE TO WEIGHT-BASED BULLYING

By Brian Zahn

Young LGBT people may experience more teasing and harassment about their weight — regardless of their physique — than straight teenagers, according to findings from researchers with the University of Connecticut Rudd Center for Food Policy and Obesity.

According to the data, more than half of overweight and underweight respondents reported weight teasing by either their family or their peers.

“There is a very high vulnerability for sexual and gender minority youth,” said Rudd Center Deputy Director Rebecca Puhl.

Across sexual identities, between 44.1 and 70 percent of respondents reported being teased about their weight by family and between 45 and 57.4 percent reported being teased by their peers about their weight. And 61.6 percent of non-binary teenagers assigned female at birth and 64.4 percent of transgender boys reported weight-based teasing by their families, the Rudd Center study said.

Researchers Puhl, principal investigator Ryan Watson and Mary Himmelstein analyzed 9,838 responses to the Human Rights Campaign’s LGBTQ National Teen Survey in 2017, in which teenagers self-identified among a broad array of sexual and gender identities. Researchers used respondents’ height and weight data to calculate their body mass index.

Puhl said she was struck by how more than half of underweight respondents reported weight-based bullying by either family or peers.

“A lot of times when we talk about weight-based bullying and weight-based teasing, the emphasis is on a higher body weight,” she said. “We really need to be paying attention to this problem for kids, regardless of their body sizes."

Puhl said many school-based bullying policies ignore language around weight. She said many LGBT youth can benefit from having adult advocates who are proficient in issues around LGBT issues and bullying around weight, such as a physician.

“A lot of kids have multiple stigmatized identities, and that’s what this study is telling us,” she said.

The rate of adolescent obesity is nearly 20 percent, Puhl said.
“Past research shows if they are teased or bullied about their weight, then there are higher levels of depressive symptoms, anxiety, poor body image and suicidal thoughts. We see that kids more often turn to food as a coping strategy and are more likely to engage in binging or other disordered behavior,” Puhl said. “We also know from longitudinal research that being teased about it predicts weight gain over time and contributes to obesity.”

Puhl said the study was the first to look at the intersection of weight-based bullying in LGBT youth, and it raises questions about how weight-based bullying manifests itself between sexual and gender identities. In past research on the broader population of weight-based bullying, Puhl said bullying can affect boys and girls differently; for boys, it can mean being called names, but weight-based bullying for girls often looks like social exclusion and rumor spreading.

UCONN STUDY: WEIGHT-RELATED BULLYING LEADS TO POOR HEALTH OUTCOMES FOR LGBTQ YOUTH

By Brian Zahn

A study released today by the University of Connecticut’s Rudd Center for Food Policy & Obesity found a correlation between weight-based bullying of LGBT youth and substance abuse and poor mental health.

Lead researcher Rebecca Puhl said the study is among the first to explore the link between these factors. “This study is really the first large-scale evidence of the relationship between weight-based teasing and bullying and adverse health behaviors in sexual and gender minority youth,” she said.

Although there is a wide body of research into how sexual and gender minority youth have worse mental health outcomes and higher rates of substance
abuse — such as a 2008 report published in the journal "Addiction" on 14 studies, concluding that on average lesbian, gay and bisexual youth were on average 190 percent more likely to use tobacco, alcohol or illicit drugs — Puhl said the effects of how weight-based victimization could exacerbate the issues for sexual and gender minority youth had not been explored.

Using data collected from 17,112 teenage respondents to an online survey, Puhl and co-researchers Mary Himmelstein and Ryan Watson found that more than half of respondents indicated they had been subjected to weight-based bullying or teasing from their peers and/or their families. Within their lifetimes, 55.6 percent reported they had consumed alcohol, 27.1 reported consuming alcohol in the last 30 days and 9.6 percent reported binge drinking in the last 30 days.

However, those who reported weight-based victimization from their families were 27 percent more likely to have done binge drinking in the last 30 days and were 23 percent more likely to have smoked a cigarette in the last 30 days.

Additionally, sexual and gender minority youth experiencing weight-based victimization had overall lower self-rated health outcomes such as depressive symptoms, self-esteem and perceived control over stressors than sexual and gender minority youth who did not report weight-based victimization.

A Rudd Center study released in February also concluded that sexual and gender minority youth are more likely than their heterosexual peers to experience weight-based victimization regardless of their body weight.

"Whether they are being teased for a higher or lower body weight, they’re both vulnerable to these health consequences," Puhl said.

Puhl said most of her recommendations from the study center around education: both in educating families about the harm done by weight-based teasing and bullying and creating more comprehensive anti-discrimination policies in schools.

In New Haven, an LGBTQ Youth Task Force formed about one year ago, and its members have visited Board of Education members to make recommendations to create more inclusive schools. Members have urged the school board to create policies that fundamentally respect and acknowledge sexual and gender minority identities.

"It’s bigger than just bullying," said Fair Haven Middle School teacher David Weinreb, a task force member at a school governance committee meeting on May 28.

“A 14-year-old doesn’t necessarily know what their legal right is and doesn’t know how to ask for it,” said member Kelly Wuzzardo.

Puhl said the study’s findings could also better inform medical care of sexual and gender minority youth.

“There’s also an implication for clinicians and health care providers working with youth or adolescents to assess for weight-based victimization experiences,” she said.

Puhl said she believes longitudinal studies should be a future inquiry.

“This was a one time-period study," she said. “But we need to understand what this means for health over time.”
JUNK FOOD COMPANIES SPEND BILLIONS OF DOLLARS ON ADS TARGETING BLACK CHILDREN

Black teens saw more than twice as many television ads for fast food, candy, sugary drinks and unhealthy snacks compared with white teens in 2017, according to a new study.

By Lauren Weber

Companies that deal in the unhealthiest of foods are targeting television advertising at black and Hispanic youths, according to a new study, even after many of those corporations pledged their commitment to promoting healthier eating.

Food companies spent $11 billion on television ads in 2017, and 80 percent of that, about $8.8 billion, was spent on their unhealthiest offerings sugary soda, fast food, candy and unhealthy snacks. What’s more, black teens are more than twice as likely as white teens to see commercials for these items, the study found.

The report — released by the Rudd Center for Food Policy & Obesity at the University of Connecticut and co-produced by the Rudd Center, the Council on Black Health at Drexel University and Salud America! at the University of Texas Health Science Center at San Antonio — looked at 2017 syndicated Nielsen market research for its findings.

This year’s report follows up on research done in 2015, and compared with four years ago, television advertising for unhealthy snacks and sugary drinks targeted to black viewers is up 50 percent.

These food ads push foods that contribute to obesity, only worsening a public health crisis that disproportionately affects communities of color, said study author Jennifer Harris of the Rudd Center.

“It’s perpetuating the disparities that we all already see in kids’ health. Kids are very vulnerable to advertising, much more so than adults,” she said. “It’s making the public health community’s job so much more difficult. It’s making parents’ jobs so much more difficult.”

“Targeted marketing to low-income kids and kids of color is a significant public health threat,” Jim Krieger, the executive director of Healthy Food America, told HuffPost. He decried food companies’ “predatory marketing practices.”

No one spends billions of dollars if they
don’t expect it to have an impact, Harris concurred.

*The big issue is you follow the money.*
— Dr. Christopher Bolling, chairman, American Academy of Pediatrics section on obesity

Dr. Christopher Bolling, who chairs the American Academy of Pediatrics section on obesity, argued that this racial targeting comes down to a common denominator: poverty. He said kids of lower socioeconomic status are more likely to live in food deserts where healthy foods are largely inaccessible and there are the most fast food restaurants per capita. And African-Americans under 18 are three times as likely to live in poverty as white youths. Hispanic children are more than twice as likely as white kids to live in poverty, according to 2017 data from the Annie E. Casey Foundation.

“The big issue is you follow the money,” he said. “The [companies] get better return for their buck by advertising heavily in those areas, as that’s where people live and are going to have access to those foods.”

The Rudd report also found that companies didn’t spend any money to advertise healthy food options of their products on Spanish-language television.

“It’s just really tough when the cheapest thing to get adequate calories is through junk food,” said Rafael Perez-Escamilla, a professor at the Yale School of Public Health. “This is not about personal choice when there is no availability there.”

These ad dollars are devastating in light of the ongoing obesity epidemic in America, which affects almost 26 percent of Hispanic children and 22 percent of black youths, compared with 14 percent of white children, according to the Centers for Disease Control and Prevention.

And attracting children at an early age makes them permanent customers by fixing their taste preferences, which are incredibly difficult to alter, Perez-Escamilla added.

“When you have companies going after toddlers and infants, it’s insane,” he said. “Once you hook people especially starting with young children, which is very upsetting essentially you start training them not only on your brand but on how sweet, how salty, how caloric they’re going to like [their food] as they grow.”

After the first Rudd report on food advertising spending disparities for black and Hispanic youths was released in 2015, a number of companies — like Coca-Cola, Yum! Brands (which owns Taco Bell and KFC), Hershey and PepsiCo — announced corporate responsibility initiatives to promote health and wellness, as well as sponsorships. Yet since then, overall food-related spending on black television programming aimed at a black audience grew by 50 percent from 2013 to 2017.

*The truth of the matter is the [companies] have plenty of opportunity to self-police and self-regulate, and over and over again we’re seeing it just doesn’t work.*
— Rafael Perez-Escamilla, professor at the Yale School of Public Health

Harris said that the self-policing and responsibility initiatives that major corporations promised after the last report are clearly not having the desired effect. Nor are they being extended to consumers of color, the report said.

“You can now understand this is a trend,”
Perez-Escamilla said. “The truth of the matter is the [companies] have plenty of opportunity to self-policing and self-regulate, and over and over again we’re seeing it just doesn’t work.”

He argued it was time to take another look at sugar taxes or follow Chile’s example of cracking down on unhealthy eating. The country recently instituted strict marketing and labeling laws that make sugar and other unhealthy content abundantly clear.

But he warned that the current political environment one in which Donald Trump’s administration has loosened health restrictions on school lunches and fought sugar taxes did not bode well for progress.

Bolling echoed those fears, saying, “It scares me to death.”

For Krieger, while there are limited options at a federal level to combat such marketing, he’s heartened by new advertising attempts to counter the onslaught of unhealthy food ads much like the ads against tobacco that have proliferated on the airwaves in recent years.

Combine that with the seven U.S. cities that have enacted sugary-drink taxes, he said, and there are reasons to be optimistic.

But for Perez-Escamilla, studies like this just reiterate how the U.S. continues to ignore the severity of its obesity crisis.

Change is voluntary, he stressed. “It’s not going to stop unless we deal with it.”
Though the science has shown sugary drinks are not healthy for children, fruit drinks and similar beverages accounted for more than half of all children’s drink sales in 2018, according to a new report.

The Rudd Center for Food Policy & Obesity at the University of Connecticut released a report Wednesday that found that fruit drinks, as well as flavored waters with added sugars and/or low-calorie sweeteners, made up 62 percent of the year’s $2.2 billion drink sales.

Healthier drinks, such as water or juices made from 100 percent juice, made up 38 percent of sales during the same year.

And plenty of money was spent on advertising these beverages. Companies spent $20.7 million to advertise children’s drinks that contained added sugars. Children ages 2 to 11 saw more than twice as many TV ads for children’s sweetened drinks than for children’s drinks without added sweeteners.

“Beverage companies have said they want to be part of the solution to childhood obesity, but they continue to market sugar-sweetened children’s drinks directly to young children on TV and through packages designed to get their attention in the store,” said Jennifer L. Harris, Ph.D., MBA, lead study author and the Rudd Center’s director of marketing initiatives. “Parents may be surprised to know that pediatricians, dentists and other nutrition experts recommend against serving any of these drinks to children.

Dr. Harris’ team evaluated 67 drinks to see the differences between sweetened drinks and beverages without added sweeteners.

Packaging Problems

Experts say that juice and water blends without added sweeteners have started to hit the market, but the nutrition claims and images can make it difficult for parents to pinpoint which drinks are healthier.

Sugar-sweetened fruit drinks marketed to children typically included 5 percent juice or less, but 80 percent of those packages portrayed images of fruit and 60 percent claimed to have “less” or “low” sugar or “no high fructose corn syrup,” the report said. Children’s drinks with and without added sweeteners also had similar package sizes and types, flavor names, use of fruit imagery and front-of-package claims for products.

Low-calorie sweeteners, such as...
sucralose and stevia, were in 74 percent of children’s sweetened drinks. They were also in drinks that contained added sugars, but there was no mention of low-calorie sweeteners on the front of packages.

Why Sugar Stays

One-third of all children’s fruit drinks included 16 grams or more of sugar per serving — the same as 4 teaspoons, which is about half of the maximum amount of added sugars experts recommend for children a day.

Allison Sylvetsky Meni, Ph.D., an assistant professor of exercise and nutrition sciences at Milken Institute School of Public Health at The George Washington University, said a number of factors continue to make sales strong for sugary drinks. Many children like the taste, some people think as long as kids aren’t drinking soda that it’s healthy, and sugary options can be more affordable than healthier ones.

“The juicing trend has given new life to juice sales,” added Sharon Palmer, a registered dietitian nutritionist from California. Many new items have come on the market, such as fresh or cold-pressed juices. Green juice blends and at-home juicing has become popular. Trendy juice blends, such as those with ginger or turmeric, are also creating a buzz in general.

Palmer believes many parents are trying to reduce sugary beverage consumption in their households, but may not realize that soda is not the only sugar-laden drink. Some fruit drinks may appear to be healthier, but many can have high levels of added sugars, she said.

What to Drink

A report released last month recommends that children under age 5 should not consume any drinks with added sugars or low-calorie sweeteners, and that they should consume limited amounts of 100 percent juice. The Academy of Nutrition and Dietetics, American Academy of Pediatric Dentistry, American Academy of Pediatrics and the American Heart Association created the recommendations.

Fruit juices that are 100 percent juice can be a part of a healthy diet for a child, so long as it is limited to 4 ounces per day for toddlers and up to 8 ounces per day for older kids, Palmer said.

“It’s more healthful to make most of the fruit servings from whole fruits, like oranges, peaches, grapes, apples — they come with fiber and all of the nutrients in the whole plant,” Palmer added. Also, diluting juice or making a flavored water can be helpful to get kids drinking healthier.

Parents should stick to giving children water, flavored unsweetened sparkling water or diluted juice, Dr. Sylvetsky Meni said.

“They need to repeatedly expose their kids to unsweetened drinks and over time, they will get used to it,” Sylvetsky Meni said.
Some overweight and obese individuals are more likely to engage in “self-stigmatization,” in which they internalize their weight stigma experiences and begin to blame and devalue themselves.

In a new study of more than 18,000 adults, researchers from Penn Medicine and the University of Connecticut Rudd Center for Food Policy and Obesity wanted to better understand who is at greater risk for this type of behavior, which has been associated with poor mental and physical health.

Their findings show that participants who reported experiencing weight stigma from others — particularly from people they know such as family, friends and coworkers — had higher levels of internalized weight bias than those who reported no experiences of weight stigma.

The study is published in the journal Obesity Science and Practice.

In addition, those who internalized weight bias the most tended to be younger, female, have a higher body mass index (BMI), and have an earlier onset of their weight struggle. Participants who were black or had a romantic partner had lower levels of internalization.

“We don’t yet know why some people who struggle with their weight internalize society’s stigma and others do not,” said the study’s lead author, Rebecca Pearl, Ph.D., an assistant professor of psychology in psychiatry in the Perelman School of Medicine at the University of Pennsylvania.

“These findings represent a first step toward helping us identify, among people trying to manage their weight, who may be most likely to self-stigmatize. People who are trying to lose weight may be among the most vulnerable to weight self-stigma, but this issue is rarely discussed in treatment settings.”

In this study, the researchers surveyed more than 18,000 adults enrolled in the commercial weight management program WW International (formerly Weight Watchers Inc.) in order to identify the key characteristics and experiences of people who internalize weight bias. The study is the largest investigation of weight self-stigma to date.

The participants recalled when they
had experienced weight stigma from other people during their lifetime, how frequent and how upsetting the experiences were, and who it was that called them names, rejected them, or denied them an opportunity simply because of their weight.

The results show that nearly two-thirds of the participants reported experiencing weight stigma at least once in their life, and almost half reported experiencing these events when they were children or teens. The researchers looked at the relationships between these experiences and levels of self-directed stigma.

Participants who reported experiencing weight stigma from others had higher levels of internalized weight bias than those who reported no experiences of weight stigma.

This link was even stronger among participants who had weight-stigmatizing experiences early in life and who continued to have these upsetting experiences as adults. Those who experienced weight stigma from family members or friends, or from those in their workplace, community, or health care setting, also had greater evidence of weight self-stigma compared to participants who did not encounter weight stigma from those sources.

“Our findings can inform ways to support people who are experiencing or internalizing weight stigma, including opportunities to address weight stigma as part of weight management and healthy lifestyle programs,” said principal investigator Rebecca Puhl, Ph.D., a professor of Human Development and Family Sciences at the University of Connecticut.

The study sample represented only a small percentage of WW members, so the findings may not generalize to all members or to adults trying to lose weight in other ways. Some previous research has suggested that people who internalize weight bias may have worse long-term weight loss outcomes, but more research on this topic is needed.

The research team is developing a psychological intervention for weight self-stigma that can be incorporated into weight management.
Women’s bodies are trapped by cultural rhetoric. They are continually objectified and expected to espouse certain ideals, but at the same time they are the center of a conversation involving scientists, cultural critics, and everyday people who are increasingly aware of the dangers of judging beauty. Men and their bodies, meanwhile, receive less attention. But a study published Wednesday in Obesity suggests it’s time that changed.

While the way men feel about their bodies remains overlooked and understudied, that doesn’t mean that there’s nothing hazardous going on there. As the new study from the Rudd Center for Food Policy and Obesity at the University of Connecticut shows, men who experience weight stigma are at risk of serious health consequences — and many are experiencing those consequences already.

Weight stigma, as it’s defined by the National Eating Disorders Association, is discrimination or stereotyping based on a person’s weight. In the new study, a team led by postdoctoral fellow Mary Himmelstein, Ph.D., asked 1,753 American men to self-report their height, weight, demographics, and the extent to which they experienced weight stigma. They were also asked whether this stigma was something that they internalized (did they blame themselves?) or something that was put upon them by others.

The men also shared details about their health behaviors, like how often they dieted, as well as their psychological well-being.

Overall, 40 percent of the participants said they had experienced weight stigma. The men who internalized weight stigma had lower self-rated health than others, and all had an increased odds of engaging in binge eating.

Furthermore, the men who experienced and internalized weight stigma were the group most associated with more depressive symptoms and more dieting behaviors.

Men are experiencing an increasing pressure to be lean and muscular.

“Weight stigma is not a gendered issue,” says Himmelstein. “It can affect men’s health in the same damaging ways in which we already know that it harms women’s health, and neglecting issues in men, either in research or clinical practice, may put them at a serious disadvantage in treatment.”
Previous studies have argued that the high levels of body dissatisfaction among men are driven by the representation of men in media and pop culture. Recent analysis shows that media images of men are more muscular and lean than ever before. Dissatisfaction emerges from the discrepancy between actual bodies and ‘ideal’ physiques, and this dissatisfaction can lead to disordered eating, depression, and increased risk of using performance-enhancing substances.

And dissatisfaction with one’s body starts young: A 2014 study published in JAMA Pediatrics found that, out of a group of 5,527 males aged 12 to 18 years old, 18 percent were highly concerned about their weight and physique.

Himmelstein argues that there’s a need for more research exploring how men cope with weight stigma, especially if those coping responses involve behaviors like binge eating. She also advises health professionals to pay more attention to the men in their care: Historically, it’s not common for men to be asked about how they feel about their weight. That needs to change so that experts can identify who needs help and interventions can be provided before it’s too late.

Partial Abstract:

**Objective:** A substantial amount of literature has suggested that weight stigma impairs health. Evidence on gender differences in weight stigma has been mixed, but studies of weight stigma within men have been primarily absent from the literature.

**Results:** Regression analyses showed that, independent of race, socioeconomic status, and BMI, experienced weight stigma and weight bias internalization among men were associated with poor health, including greater depressive symptoms, increased dieting, lower self-reported health, and increased odds of binge eating. Neither internalized nor experienced weight stigma was consistently associated with physical activity, smoking, drinking, or trouble sleeping.
WHY EMPATHY MATTERS WHEN DESIGNING PRODUCTS

The importance of empathy to creativity was underlined by recent research from the University of Connecticut and the University of Illinois.

by Adi Gaskell

It seems intuitive that if you can step into the shoes of your customers and experience what they do, then you have a good chance of delivering exceptional customer experiences. It’s perhaps for this reason that so many successful startups emerge from the personal pain of the founders.

Nonetheless, the importance of empathy to creativity was underlined by recent research from the University of Connecticut and the University of Illinois, which asked participants to imagine consumers eating a snack before then designing that snack on their behalf.

When compared with a control group who were simply asked to design a snack objectively, the empathetic group produced considerably more creative products.

“Child’s play
The volunteers were tasked with completing a number of product design-related tasks, including designing a children’s toy and a new breakfast cereal. The conditions for each task were as outlined above, with one group tasked with thinking about the feelings of the end user, and the other simply designing the products as objectively as they can.

Each product was then judged by experts in that particular area, none of whom were aware of the makeup of the teams or their particular circumstances. They judged the product designs purely on their creativity.

So what does empathy do to make us more creative? The researchers believe it triggers something known as ‘cognitive flexibility’, which is the ability to consider things from a number of perspectives simultaneously.

What’s more, it also emerged that the ideas were not only more creative when we thought in such a way, but they were also often more feasible to the end user.

Better products
The researchers highlight how a growing number of companies solicit new ideas...
from customers and other stakeholders, with the likes of Starbucks receiving over 150,000 ideas through its crowdsourcing project.

Whilst the value of such ideation platforms is open to debate, the team believe that their findings could help such efforts produce even more creative and useful ideas.

“We were trying to brainstorm context where people could design for others,” they conclude. “Our participants spent a lot of time thinking these projects through, in some cases much more time than they needed to. One of the things we love about testing creativity is that it is engaging, and people say it is a fun task. Through these simple experiments, we’ve shown that consideration of an end-user’s feelings is a potent tool for developing innovative new products and solving problems that exist in the marketplace.”

THE SKINNY ON SCHOOLS’ EFFORTS TO PROMOTE HEALTHY EATING

Schools that promote healthy eating may reduce kids’ risk of obesity, new research finds.

Their study of nearly 600 middle schoolers in New Haven, Conn., found that such efforts limited increases in kids’ body mass index (BMI -- an estimate of body fat based on height and weight).

The efforts included nutrition newsletters for students and families; making sure school-based meals met federal nutrition guidelines; limiting sugary drinks and encouraging water consumption; and limiting use of food or drink as rewards for good grades and behavior.

By the end of the five-year study, the...
average BMI increase was 1 percent among kids in schools with nutritional programs and policies, compared with 3 percent to 4 percent elsewhere.

The study was recently published in the American Journal of Preventive Medicine.

“These findings can guide future school and community interventions. Childhood obesity is a serious health threat, and schools are a vital way to reach children and their families to reduce risks and promote health,” said lead author Jeannette Ickovics. Ickovics is a professor of social and behavioral sciences at Yale University.

“These findings strongly support previous administration policies that provided healthier food for all children in public schools,” she added in a university news release.

Those policies were recently rolled back by the Trump administration.

“This is some of the strongest evidence we have to date that nutrition education and promoting healthy eating behaviors in the classroom and cafeteria can have a meaningful impact on children’s health,” said study senior author Marlene Schwartz. She is director of the Rudd Center for Food Policy and Obesity at the University of Connecticut in Storrs.

“These findings can inform how we approach federal wellness policy requirements and implementation in schools to help mitigate childhood obesity,” Schwartz said in the news release.

More than 1 in 5 American teenagers are obese, and as many as half are overweight or obese, according to the researchers.
NEW DRUGS EMERGE TO TREAT SICKLE CELL DISEASE

The FDA approved Oxbryta, a once-daily pill from Global Blood Therapeutics

By Peter Loftus

The U.S. Food and Drug Administration approved a new drug for sickle cell disease Monday, adding to a new wave of treatments that promise relief from the life-threatening blood disorder that largely afflicts African-Americans.

Oxbryta, a once-daily pill from Global Blood Therapeutics Inc., GBT +5.73% blocks a process in blood cells that can lead to anemia and organ damage, hallmarks of sickle cell disease. It is the second treatment to get FDA approval in recent weeks, after the agency approved Novartis AG’s Adakveo to reduce the frequency of bouts of pain that sickle cell patients can suffer.

Doctors say the new drugs have the potential to ease the complications of sickle cell disease, which afflicts about 100,000 Americans.

More new treatments are on the horizon. Drugmakers including Bluebird Bio Inc., Vertex Pharmaceuticals Inc. and Crispr Therapeutics Inc., along with government researchers, are developing experimental therapies that may have potential to cure or provide long periods of relief.

"Everybody’s been waiting for this moment where the flood gate of new treatments is opening," said Dr. Biree Andemariam, chief medical officer of the Sickle Cell Disease Association of America and a sickle cell specialist at UConn Health, in Farmington, Conn.

But the therapies are expensive, part of a growing trend of high prices for drugs that treat rare diseases. Global Blood Therapeutics priced Oxbryta at $125,000 a year, though the company said the drug would cost most health plans $96,000 a year after discounts. Novartis’s drug lists for as much as $113,100 a year, depending on the weight of the patient.

Drugmakers say the treatments can help cut other costs, such as hospitalization.

Sickle cell disease is caused by an inherited mutation in an oxygen-carrying protein known as hemoglobin. Decades ago, most children diagnosed with it didn’t live into adulthood. Life expectancy has risen significantly since the 1980s, due to newborn screening and treatment advances like blood transfusions and penicillin to prevent severe infections.

But most patients don’t live longer than 50 years, doctors say, and many face debilitating complications including strokes and kidney failure.
Few drugs have been approved in recent decades.

Global Blood Therapeutics, of South San Francisco, Calif., designed Oxbryta to stop a molecular process that results in sickle-shaped red blood cells, the feature that gives the disease its name.

After 24 weeks of treatment, about 51% of the clinical-trial subjects who had received a high dose of the drug had higher levels of hemoglobin, the protein that carries oxygen in the blood, compared with 33% among those getting a lower dose and 7% in the placebo group. Those taking the drug also experienced reduced anemia.

“We think what this drug is doing is fundamental in terms of reversing disease,” said Global Blood Therapeutics Chief Executive Ted Love.

Reported side effects include headaches and diarrhea.

The FDA approved the drug’s use in patients aged 12 years and older.

“Our scientific investments have brought us to a point where we have many more tools available in the battle against sickle cell disease, which presents daily challenges for those living with it,” said Acting FDA Commissioner Adm. Brett P. Giroir said.

Patricia Rose, 52, of Berwyn, Ill., said she took Oxbryta in a clinical trial along with another drug called hydroxyurea she has been taking since around 2000, and the combination helped alleviate the painful episodes resulting from the disease more than the older drug alone.

Novartis’s Adakveo, infused intravenously once a month, was approved in patients age 16 and older to reduce the frequency of a painful complication of sickle cell that occurs when blood circulation becomes obstructed. The pain often sends patients to the hospital.

In a nearly 200-patient study, people taking Adakveo had a median of 1.63 such episodes a year, versus 2.98 in the placebo group.

Bluebird Bio is developing a gene therapy that would deliver functional copies of the faulty gene that causes sickle cell disease and restore a patient’s ability to make healthy red-blood cells. The therapy is in mid-stage patient studies, and the company expects to file for regulatory approval in 2022, a spokeswoman said.

Meantime, Crispr Therapeutics and partner Vertex Pharmaceuticals are working on a treatment that would edit genes taken from patients’ blood samples, and then infuse them back into patients as part of a stem-cell transplant.

The National Institutes of Health said last month it plans to invest at least $100 million in the next four years toward finding affordable, gene-based cures for sickle cell disease and HIV. The Bill & Melinda Gates Foundation said it would invest an equal amount toward the goal.

“The hope is that sickle cell may be cured in some cases but in other cases managed as a chronic condition,” said Dr. Lewis Hsu, a pediatric sickle-cell specialist at Children’s Hospital University of Illinois.
Reducing high blood pressure in the elderly appears to lower their odds of developing brain lesions, a new study finds.

"I think it's an important clinical finding, and a very hopeful one for elderly people who have vascular disease of the brain and [high blood pressure]," said study co-principal investigator Dr. William White. He's a professor of medicine at the University of Connecticut School of Medicine.

Over time, high systolic blood pressure (top number in a reading) can damage small arteries deep in the brain. Reduced blood flow to the brain can lead to areas of damaged nerve cells (lesions) in the brain's white matter.

Older people with more of these lesions tend to have slower reflexes, mobility problems and more signs of mental decline, the researchers explained.

This study included nearly 200 people, average age 81, with evidence of some brain lesions and high blood pressure (average systolic blood pressure around 150 mm Hg).

Half of the participants took medicine to keep their 24-hour systolic blood pressure around 130 mm Hg for three years, and had it monitored by wearable devices. The other half took medicine to maintain a systolic blood pressure around 145 mm Hg.

Those in the more intensive blood pressure control group had significantly less accumulation of brain lesions and were less likely to have a heart attack, stroke or other major heart problems, the investigators found.

However, having fewer brain lesions was not associated with significant improvements in mobility and mental function, according to the study authors.

It's likely that three years was too short a time for such benefits to become apparent, the researchers suggested.

The study results were presented Monday at the American College of Cardiology's annual meeting, in New Orleans. Such research should be viewed as preliminary until published in a peer-reviewed journal.

"With the intensive 24-hour blood pressure treatment, we reduced the accrual of this brain damage by 40 percent in a period of just three years. That is highly clinically significant,"
White said in an American College of Cardiology news release.

Over a longer time period, he added, he believes intensive blood pressure reduction will have a substantial impact on function in older persons, as well.

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**POORE AMERICANS ARE MORE AT RISK OF TYPE 2 DIABETES**

A new study suggests a worrying wealth gap in the prevalence of this life-threatening illness

By Jeanette Settembre

Food insecurity leads to chronic health disease.

Some 40 million Americans, including 6.5 million children, live in households where they don’t have access to proper nutrition, and not having adequate food or balanced meals can lead to chronic diseases like Type 2 diabetes, a study published in the “Journal of Nutrition,” led by researchers at the University of Connecticut’s School of Medicine found.

In the U.S., the food insecurity epidemic is most prevalent among Latinos where rates of Type 2 diabetes are 12.1% among Hispanics compared to 7.4% of non-Hispanic whites, researchers noted in the study. This finding prompted them to sample 121 Latinos with Type 2 diabetes. Of those, 68% were classified as food insecure.

After paying for housing and school costs, millions of low-income Americans may have little left over for healthy food, but may not always qualify for SNAP.

After paying for housing and school costs, millions of low-income Americans may have little left over for healthy food, but may not always qualify for SNAP.

Researchers tested the relationship between lack of nutritious foods and high blood sugar using data from the U.S. Census Bureau’s “Community Health Workers Assisting Latinos Manage Stress”.

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and Diabetes” trial. They measured blood glucose, insulin levels, stress hormones and inflammation in people with adequate food and those considered food insecure.

When people don’t have enough food or aren’t eating healthy, inflammation occurs in the body. This causes stress which triggers the release of cortisol and other stress hormones that can lead to insulin resistance, (when sugar builds up in the bloodstream, which causes Type 2 diabetes). People considered food insecure had significantly higher insulin resistance, insulin, glucose, stress hormones, inflammation and total cholesterol compared to those who ate right.

“Our findings support the plausibility of links between food insecurity and poor health,” says Dr. Angela Bermúdez-Millán, assistant professor in the Department of Community Medicine and Health Care at UConn School of Medicine.

People considered food insecure had significantly more stress, which triggers inflammation and stress hormones — and insulin resistance.

It’s a problem that likely affects millions of Americans: 97% of counties in the U.S. where people can’t afford or don’t have access to healthy food. Experts say many “food insecure” families often work low-paid jobs to pay for rent and utilities, and other expenses like school supplies for their children.

They may have little left over for healthy food, but may not always qualify for SNAP (Supplemental Nutrition Assistance Program), formerly known as food stamps. And since processed foods often cost less than whole foods, many are left with settling on the cost effective alternative.

The average SNAP participant gets about $4.20 per day. An 11-ounce box of baby spinach at Walmart WMT, +0.69% costs $3.36, more than half of a day’s worth of benefits, while boxed meals, which are far less healthy, like a box of Kraft Mac & Cheese KHC, -0.11%, for example, costs 98 cents. Maintaining a clean diet is 40% more expensive than one with processed foods.

Eating an ultra-processed diet can have negative effects on health, however. Two separate studies from France and Spain published in The British Medical Journal earlier this month suggested that eating processed food can lead to an increased risk of cardiovascular disease, and a higher risk of death. ●
Having lower blood pressure can boost brain function in older adults, a new study says.

When elderly people took medicine to keep their systolic blood pressure around 130 mm for three years, they were less likely to suffer a heart attack, stroke or other cardiovascular event, according to research presented at the American College of Cardiology’s 68th Annual Scientific Session.

“I think it’s an important clinical finding and a very hopeful one for elderly people who have vascular disease of the brain and hypertension,” said William B. White, a researcher at the University of Connecticut School of Medicine’s Calhoun Cardiology Center and study principal investigators. “With the intensive 24-hour blood pressure treatment we reduced the accrual of this brain damage by 40 percent in a period of just three years. That is highly clinically significant, and I think over a longer time period intensive reduction of the ambulatory blood pressure will have a substantial impact on function in older persons, as well.”

For the study, participants, at an average age of 81 and diagnosed with hypertension, wore blood pressure monitors to keep track of their numbers around the clock. They also worked closely with their doctors to stick to a medication regime.

High blood pressure can reduce the flow of blood to the brain, known as cerebrovascular disease. This can cause lesions to accumulate in the brain and ultimately cause nerve damage. When older people build up enough of these lesions, it can lead to slower reflexes and cognitive decline.

Over time, this can hurt the small arteries in the brain’s deep regions, the study says. The intensive form of blood pressure monitoring led to a 40 percent reduction in lesion accumulation within the brain.

In contrast, people who got their blood pressure checked in a medical environment only maintained a systolic reading of 145 mm and had four times the risk of suffering a stroke, heart attack or other cardiovascular events.

“The average 80-year-old without a major illness such as cancer or heart failure can expect to live about 13 more years, and if you cut back the accrual of vascular damage over the course of that timeframe it could substantially improve..."
HIGH BLOOD PRESSURE INCREASES HEART ATTACK RISK - RESEARCH TO AVOID FATAL COMPLICATIONS

By Jessica Knibbs

HIGH blood pressure risks become more serious the older you get, and the condition is especially common in older adults. For older people with high blood pressure intensive blood pressure control may be the answer. What does it involve and how does it work?

High blood pressure is often referred to as the ‘silent killer’ as it increases the risk for heart attacks and strokes. High blood pressure occurs when the force of the blood against an artery wall is too high. Unfortunately, risk for high blood pressure increases with age, making it especially common in older adults. Aggressive treatment could improve outcomes for the elderly based on latest findings.

New research suggests that aggressive blood pressure treatment may improve brain function and reduce heart risks in the elderly and means that tighter blood pressure control can improve outcomes for elderly adults.

Driving down blood pressure to lower levels could have major benefits for people with high blood pressure and who are at risk of heart attacks.

Intensive blood pressure control means using medication to get the patients’ Systolic pressure over 120 mmHg.

Systolic pressure is the measure in the blood vessels when the heart beats. Targeting those with a systolic blood pressure of less than 120 mmHg may reduce the risk of fatal cardiovascular conditions.

A recent study at the American College of Cardiology called SPRINT compared standard vs. aggressive blood pressure control.
treatment in elderly adults.

The study involved 199 participants who took blood pressure medicine for a total of three years while researchers tracked key outcomes including the brain function and heart risks.

“In addition, this benefit would likely be amplified in people with more severe or longer-duration hypertension”

— Doctor William B. White, professor of medicine at the University of Connecticut School of Medicine

After three years the imaging had shown that participants in the more aggressive treatment group had fewer brain lesions than those in the less aggressive treatment group.

Doctor William B. White, professor of medicine at the University of Connecticut School of Medicine’s Calhoun Cardiology Centre and of the study’s principal investigators said of the study: “With the intensive 24-hour blood pressure treatment we reduced the accrual of this brain damage by 40 percent in a period of just three years.

“That is highly clinically significant, and I think over a longer time period intensive reduction of the ambulatory blood pressure will have a substantial impact on function in older persons, as well.

“In addition, this benefit would likely be amplified in people with more severe or longer-duration hypertension.”

Overall, an aggressive approach cut the risk of heart attack and other cardiovascular complications by almost one-third, versus standard treatment.

You should look out for symptoms of high blood pressure which include:

- Severe headache
- Chest pain
- Difficulty breathing
- Blood in the urine
- Fatigue or confusion
- Vision problems
- Irregular heartbeat

Anyone can develop high blood pressure and if you are living with the condition you should always know your blood pressure levels by investing in a blood pressure monitor.

You should also understand your risks and symptoms and always try and make healthier choices in your life such as taking your medication and communicating openly with your doctor.
A new study conducted by researchers from the University of Connecticut discovered that walnuts, in addition to providing several other health benefits, could help protect against ulcerative colitis.

“We are not suggesting that people with ulcerative colitis be maintained on a large walnut diet between active flares,” said researcher Dr. Daniel Rosenberg. “But, we are hoping that we’ll be able to determine the active compounds -- nutrients, phytochemicals -- in walnuts that cause protection.”

Getting the health benefits
To see the effect walnuts had on ulcerative colitis, the researchers conducted a trial experiment with mice over a two-week period in which each specimen consumed a walnut supplement.

The researchers induced ulcerative colitis in the mice using dextran sodium sulfate (DSS). By putting the mice through episodes of ulcerative colitis, the researchers were able to compare how the walnuts affected their recovery time between episodes. Ultimately, the walnuts proved to help the mice tremendously.

The researchers noted the mice's colons healed better and faster following the two-week walnut supplement regimen, and they also noticed less damage to the colon overall in the colitis episode that immediately followed the walnut intake.

The researchers are currently in the process of testing the effectiveness of walnuts on colitis in human participants.

Walnuts pack a punch
In a recent study, researchers from Penn State found that walnuts could be beneficial for consumers on the verge of heart disease who are looking to maintain their blood pressure.

After eating whole walnuts, the study’s participants saw better vital readings in arterial stiffness, central pressure, diastolic blood pressure, central systolic blood pressure, cholesterol, and brachial pressure, all of which can help reduce the likelihood of heart disease.

“When participants ate whole walnuts, they saw greater benefits than when they consumed a diet with a similar fatty acid profile as walnuts without

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eating the nut itself,” said researcher Penny Kris-Etherton. “So it seems like there’s a little something extra in walnuts that are beneficial -- maybe their bioactive compounds, maybe the fiber, maybe something else -- that you don’t get in the fatty acids alone.”

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**MAGNESIUM AND RIBOFLAVIN FOR MIGRAINES**

By Brindusa Vanta

Migraines are chronic neurological conditions characterized by intense headaches, visual disturbances and nausea. Vitamin B2 or riboflavin and the mineral magnesium appears to be safe and effective nutrients that may help prevent the migraines, based on several research studies. If you consider taking these supplements for your condition, you should first talk to your health care provider.

**Riboflavin**

In February 2011 medical journal “Current Treatment Options in Neurology” published an article by a research team from Saint Louis University School of Medicine, U.S. The scientists indicated that several alternative and complimentary therapies were found beneficial for managing migraine headaches. Among various natural treatments, riboflavin was found effective in some research studies and may be used as a prophylactic agent for migraines. University of Maryland, Medical Center also notes a study that found supplementation with riboflavin reduced by 50 percent the number of headache attacks in the subjects that participated in the research trial.

**Magnesium**

Preventing migraines is an important
part of the management of this condition. Avoiding triggers and lifestyle modifications, medications and natural supplements have been proposed by health care providers. Magnesium, vitamin B2 as well conventional drugs venlafaxine, gabapentine and naproxen are considered the second choices as prophylactic agents for migraines, according to a study published in April 2010 issue of “The Journal of Association of Physicians of India.” Another research study conducted University of Connecticut School of Medicine, U.S. suggests that magnesium deficiency is correlated with several chronic pain disorders, and optimizing the level of this mineral was found beneficial for improving migraines. This study was published in July 2009 issue of “American Family Physician.” University of Maryland, Medical Center describes another research study that found that individuals who took magnesium supplements had reduced the frequency of the headache attacks by 41.6 percent.

Safety
Both magnesium and vitamin B2 are generally considered safe and well-tolerated supplements. Over dosage of magnesium may lead with serious side effects, and this supplement should be used cautiously by individuals with kidney diseases, since this mineral is eliminated from the body by kidneys.

Considerations
Consult a qualified health care provider to find out more about vitamin B2 and magnesium supplements and possible drug and herb interactions. Keep in mind that vitamins and minerals do not replace and should not be used to replace any conventional drugs prescribed for headache migraines.

Dosage
Supplementation with vitamin B2 and magnesium should be medically supervised. University of Maryland indicates a daily dose of 400 mg of riboflavin and between 200 to 600 mg of magnesium for managing migraine headaches.
UCONN HEALTH RESEARCH SHOWS TENS OF THOUSANDS OF CT RESIDENTS FACED MEDICAL-DEBT LAWSUITS

By Matt Pilon

Debt-collection lawsuits against Connecticut patients with overdue medical bills have been on the decline in recent years, but hospitals and other in-state health providers are still suing at a healthy clip.

That’s according to recent research by the Health Disparities Institute (HDI) at UConn Health, which found that nearly 86,000 medical-debt lawsuits were filed in small-claims court between 2011 and late 2016.

Those lawsuits claimed, at least initially, more than $110 million in debts owed.

HDI’s debt research is ongoing, but the figures in its first brief are noteworthy, as state-level data and insights into medical debt can be difficult to find.

Surveys, mostly national in scope, have shown that medical debt is a reality for many Americans, which can lead to financial struggles, poorer health outcomes, and racial disparities.

But, bit by bit, the body of research on medical debt in Connecticut continues to grow.

It’s important to note that Connecticut doesn’t appear to stick out negatively among other states. For example, an Urban Institute study found that Connecticut had the fifth-lowest share of adults in the country who reported past-due medical debt in 2015. The 16 percent of Connecticut adults reporting debt that year was down from 26 percent in 2012, one of the largest declines in the country.

State reports also show that Connecticut acute-care hospital’s “bad debt,” which are bills deemed uncollectible after patient services were delivered, declined between 2014 and 2017 from $506.1 million to $372.9 million.

However, that doesn’t mean patients don’t struggle with healthcare costs.

“The vast majority [of debt] is under the surface,” Villagra said.
the Universal Health Care Foundation found that half of Connecticut adults in the past 12 months had been uninsured due to the high cost of premiums; delayed health care due to cost; or struggled to pay medical bills.

“Health insurance is supposed to protect people from financial devastation and I don’t think it’s doing its job,” said Jill Zorn, senior policy officer at Universal Health Care Foundation.

**Better but not great**

HDI’s small-claims data show that both the volume of medical-debt lawsuits as well as the amounts plaintiffs claimed began to decline in 2014.

Villagra credits the Affordable Care Act for that, since it decreased the number of people who are uninsured and put some restrictions on aggressive billing and collection practices.

It fits with a broader national trend, according to the federal National Health Interview Survey, which found that the number of Americans having trouble with medical bills has declined since the ACA was enacted. However, blacks and Hispanics struggled with bills at higher rates.

Villagra said those disparities are a key concern for HDI, and he supports better education to promote health-insurance literacy for patients and doctors alike.

Other factors could be contributing to the dip in lawsuits, HDI observed, including higher employment levels in the state and new restrictions on “surprise billing,” which is when patients are unknowingly treated by an out-of-network provider at an in-network hospital, increasing out-of-pocket costs.

Still, Villagra has concerns, since those factors — perhaps outweighed by the ever-climbing cost of premiums, deductibles and other insurance “cost-sharing” — haven’t eliminated the medical-debt problem.

For example, more than half of the summoned defendants in the cases his team analyzed didn’t show up for court, which often guarantees a ruling in the plaintiff’s favor.

Villagra said he wants to better understand the reasons for the no-shows, and is pondering whether reforms are needed at the state level to ensure alleged debtors receive their court summons and that claimed amounts owed are detailed and accurate.

“Generally, I have a big problem with pricing practices that are unreasonable in health care,” he said. “It is so difficult to get [providers] to give you something that is understandable, where you know what you’re paying for.”

For now, Villagra and his team have plenty of work ahead as they pursue other research questions based off the debt data.

They are designing a survey to ask Connecticut physicians and patients about how collection practices and billing lawsuits impact the doctor-patient relationship.

Villagra said there hasn’t been much academic research into that question, but from his experience practicing medicine for about a decade into the 1990s, he has a hunch HDI might learn that trust, physicians’ roles as advocates for their patients, and quality and continuity of care all suffer when providers are chasing a patient over an unpaid bill.

As hospitals and provider groups grow larger through mergers and acquisitions, Villagra said billing and collection decisions are getting further away from physicians themselves.

“I am convinced I am going to find out that many of these doctors don’t know that the patient they’ve had for years is suddenly in court because they couldn’t pay,” he said.
JAX MICE ARE ROCKETING TO INTERNATIONAL SPACE STATION

Jackson Laboratory scientist Se-Jin Lee and Emily Germain-Lee with Connecticut Children’s Medical Center are leading a project that’s sending a cohort of JAX mice to the International Space Station.

By Laurie Schreiber

A batch of mice bred by Jackson Laboratory, headquartered in Bar Harbor, will be traveling to the International Space Station next month.

The mice are part of a 40-day space mission expected to help scientists understand more about bone and muscle loss in both astronauts and earthlings who suffer from diseases such as ALS and cancer, as well as the general effects of aging, according to a news release.

The project’s principal investigator is Se-Jin Lee of JAX, who received a grant from the Center for the Advancement of Science in Space to conduct experiments onboard the station during its mission from December to January. The research team includes scientists from JAX, the University of Connecticut School of...
**Preparing for launch**

“Mighty Mice” are genetically engineered mouse models that lack myostatin, a protein that limits muscle growth, and therefore display increased muscle mass. Lee discovered myostatin in 1997, and the breakthrough is considered a milestone in aging and disease research, according to the release.

The mice can be used to model the clinical effects that myostatin inhibitors have on muscle and bone loss, particularly related to disuse.

“This study will relate to humans who suffer from disuse-related muscle loss, like the elderly or bed-ridden,” Scott said.

How are the mice prepared for launch?

“They arrive at the launch site several weeks ahead of launch to become accustomed to the habitats, food and water that sustain them during their time in orbit,” she said. “Any mice that experience difficulty adapting to the new conditions or show signs of distress prior to launch are excluded from the flight cohort.”

How do they eat and sleep in space? With regard to sleep, it varies, she explained.

“But that is part of the adaptation process of living in microgravity,” she continued. “The mice are group housed on orbit in groups of five to 10, as mice are social animals. The habitats currently include a small hut that enables the mice to huddle and sleep together.”

For food, rodent food bars are available for the mice to eat.

“How and water are provided to the mice on orbit in excess so that they can eat, drink and sleep as they choose,” she said.

During spaceflight, mice engage in normal activities related to feeding, grooming, and interacting with other mice, according to NASA article published in April that explains how mice adjust to microgravity.

The rodents quickly adapt to weightless circumstances. For example, they anchor themselves to the habitat walls with their hind limbs or tails.

**Student partnerships**

In addition to the science, Lee will engage with students from two public high schools in Hartford, Conn., throughout the project so they can analyze the data and make predictions about the mission. Future plans include bringing the STEM learning experience to schools in Maine and beyond, said Scott.
Few issues have garnered as much attention – and feedback – as the contentious suggestion to move the Icelandic clock back one hour to better align with solar time.

“We should let the clock alone,” one Icelander protests. “It’s not the clock’s fault that the Icelanders go to sleep late.” According to a report commissioned by the Ministry of Health, however, this may not be true: “Individuals residing in the westernmost area of a given time zone go to sleep later and sleep less than individuals residing more easterly, where the sun rises earlier.” Additionally, Iceland observes Greenwich Mean Time, which means that it is an entire zone to the west of its “correct” geographical time zone.

Another Icelander, advocating for the status quo, also ignores these findings: “There is no problem here, just people with too much free time on their hands who invent problems and then ‘solutions.’” This too, according to the report, is not true. On average, Icelanders go to sleep later than citizens in neighbouring countries, and Icelandic teenagers sleep less than their European counterparts. In other words, the problem is real.

Despite such findings, Icelanders are not convinced that changing the clock will have a positive impact. In this era of fake news, where opinions and facts often get confused, the clock debate is worth a closer look.

A brief history of Icelandic time
The origin of this “issue with the clocks” can be traced back to 1907 when the Icelandic government formally adopted Icelandic Mean Time, eliminating time difference between different parts of the country. With this legislation, all of Iceland conformed to the country’s given time zone (UTC-1), as established by the International Meridian Conference in Washington D.C. in 1884. As before, the Icelandic clock corresponded roughly to solar time; when the sun reached its zenith, the Icelandic clock struck noon (or around 12.30pm).

In 1917, following in the footsteps of Germany and other European countries, Iceland adopted daylight saving time, moving the clocks forward in the summer and back again in winter. The reason, as noted in the report, was to “achieve greater harmony between daylight and working hours, which in turn was believed to save energy.”

The Icelandic government exercised its right to advance the clock in 1917 and 1918, but not again until 1939, when daylight saving time was readopted. It remained in continuous effect until 1968, when new legislation was passed in which Iceland adopted “summer
time,” or Greenwich Mean Time, the whole year round. Under this new arrangement, noon in Iceland was delayed by an hour (from 12.30pm to 1.30pm). According to a memorandum that accompanied the legislation, the twice-yearly moving of the clock was a hassle. It caused “confusion” in airline schedules; necessitated the “resetting of clocking-in machines;” “disturbed the sleep habits of individuals, and especially infants;” and, more importantly, perhaps, given that darkness was a non-issue during summer (the sun doesn’t set from mid-June to mid-July), most Icelanders favoured more sunlight later in the day – as opposed to in the mornings. But that was 1968.

New science
As noted in the report that prompted the debate, new research has emerged suggesting the adverse health effects of circadian misalignment: “An early clock means that the sun rises later, which is likely to distort the information that the body uses to coordinate physiological processes.” There is even research suggesting a link between circadian misalignment and cancer.

Addressing the subject online, Professor Richard G. Stevens at the University of Connecticut – whose work focuses mainly on the aetiology of cancer – writes: “One hour in the course of human activity may not matter much in the middle of the day, but at the beginning of the day, when the physiological transition from night to day should begin, it can make a difference in circadian alignment. With each such wake-up in the dark, there comes a small degree of circadian misalignment and a slight phase advance. Phase advance is the body thinking it’s sunrise before the sun has actually risen.” The question many researchers are studying is whether this small circadian disruption occurring daily for years or decades can make diseases like cancer more likely.

When asked about the subject of the Icelandic clock, Stevens referred to the issue as a “wicked problem.” “There is no simple solution that will satisfy everyone,” he wrote. “I suspect that the reason Iceland uses UTC-0 instead of UTC-1 is for business and commerce. This is part of the wicked problem. How to balance robust commerce with optimum human health?”

On the other hand
Most detractors of the clock-moving measure fear losing precious sunlight during the dark winter afternoons and evenings. “I believe that the health of my compatriots will decline considerably if the clock is moved back,” one Icelander writes. “You are taking an hour away from individuals who exercise after work, who play golf, who go for walks, who ride their bikes, etc.”

This argument, which is based on personal experience, rings true for many people. The problem is that such statements fail to address the scientific literature. As Till Roenneberg, a professor of chronobiology at the Institute of Medical Psychology at Ludwig-Maximilian University in Munich explains, “the human biological clock, which regulates processes from gene expression to behaviour, like that of most organisms, synchronises to the Earth’s 24-hour rotation using signals from the environment (zeitgebers). This synchronisation is an active process called entrainment. If humans were entrained by social time, average sleep-wake behaviour should not change from East to West,” Professor Roenneberg writes. His results “strongly suggest that the human circadian clock is predominantly entrained by sun time rather than by social time.”

The experts agree
The authors of the report commissioned by the Ministry of Health were unequivocal in their recommendation that the clock be moved back. And so is Dr. Sigurðardóttir: “What’s most important as regards this
issue with the clocks,’ in my opinion, is that social time and circadian time are not in sync. All living things, human beings included, coordinate biological processes with the help of the sun. The circadian clocks of most human beings do not synch with the clock on the wall, which means that unlike the clock on the wall, we must reset ourselves every day and the best way to do that is with sunlight in the morning. I understand the perspective of those who want sunlight later in the day, but from a biological perspective, it’s healthier for us to get more sunlight in the mornings."

Where does this leave us?
Last January 17, Icelandic Prime Minister Katrín Jakobsdóttir decided that parliament would not vote on the “clock issue” this spring. “The matter has been in review for a week and we have received more than a thousand comments, which tells me something that I like best about the Icelanders – they don’t bite their tongues when one asks for their opinion. They show up and speak up.” The only real question, perhaps, is whose voices the government will heed?

ULTRAFINE PARTICLES ARE AN EMERGING ENVIRONMENTAL HEALTH RISK

Ambient particulate matter air pollution is one of the top ten causes of illness and death in the world.

Doug Brugge, Ph.D., MS, professor and chair of the department of public health sciences, University of Connecticut School of Medicine, UCS Science Network, UCS

Ambient particulate matter air pollution (PM) is one of the top ten causes of illness and death in the world. While PM pollution is worse in many developing countries, it remains a problem in the United States as well. Many people in the US may not be aware of the magnitude of the problem because the levels of pollution that present a health risk include concentrations that are usually not readily visible.

This article was published on November 15, 2019.
PM that is less than 2.5 microns in diameter, called PM2.5, is the form of PM that is usually considered when assessing health risks. It is also regulated at the federal level in the US. Because of the deep research base and government regulation that follows from the evidence, PM2.5, also called “fine PM,” gets some well-deserved attention. However, there is rapidly emerging evidence that another type of PM, ultrafine particles, represents an additional distinct and unregulated risk.

Ultrafine particles (UFP) differ from PM2.5 in that they are much smaller (<0.1 microns). Because they are so small, they have very little mass. Thus, whereas PM2.5 is measured by weight, UFP are usually measured by counting the number of particles in a volume of air, typically a cubic centimeter. However, their small size is not the only thing that distinguishes UFP from PM2.5. They also behave differently in the air and are elevated in different patterns in time and across geographic areas.

I have been involved with research that is among a growing number of teams that have assessed UFP distribution in urban areas. Because cars are the dominant source of UFP in most urban areas in countries like the US, we have focused on major roadways and highways. There is, and has been for a while, convincing evidence that UFP levels are substantially elevated next to such roadways on a regular basis.

In contrast, PM2.5 has much less dramatic levels immediately adjacent to traffic sources. This is because PM2.5 is formed largely from precursor gasses by chemical processes that take time to evolve. PM2.5 is often found to spread over 10s or 100s of kilometers with some variation in levels, but not nearly as dramatic as those found for UFP.

From a health research standpoint, this has made it much easier to study PM2.5 than it is to study the health effects of UFP. People living in a single metropolitan area, for example, will usually have similar PM2.5 exposures. The same people could, however, have very different UFP exposures, especially if they differ in terms of living or spending time next to a highway. Just 100 meters away from high volume traffic UFP levels are substantially lower.

Much of the challenge of the UFP health research I have been a part of has had to grapple with the fact that their concentration changes rapidly in both space and time while people move into and out of fields of exposure. The excruciating care required to assign exposure has held back health research on UFP. It is only in the last 3-4 years that numerous studies showing risks from long term exposure have begun to emerge. So far findings point particularly at cardiovascular and neurological risks.

Because they are so small, UFP act more like gases than particles in the air. Like gasses, they tend to diffuse rather than the way PM2.5 settle or impact on surfaces. This affects strategies to reduce exposure. My collaborators and I like high-quality filters that remove UFP effectively for use in near-highway homes. We also prefer substantial air recirculation since it reduces infiltration into indoor spaces. Air movement also leads to great deposition from diffusion.

While the US Environmental Protection Agency is not yet convinced there is a causal link between UFP and health, they have been paying close attention and devoted considerable space to UFP in their recent Integrated Science Assessment for PM. Until the research reaches a critical mass and regulations are enacted, we need to continue doing research, educating the public and policy makers about this concern and developing and implementing local interventions to proactively protect highly exposed populations.
Intensive lowering of ambulatory blood pressure in older patients with hypertension reduced accumulation of small vessel disease in the white matter of the brain, according to a study published online Oct. 14 in Circulation.

William B. White, M.D., from the University of Connecticut in Farmington, and colleagues randomly assigned 199 patients (mean age, 80.5 years) who had magnetic resonance imaging evidence of white matter hyperintensity lesions to either intensive treatment (24-hour mean systolic blood pressure of ≤130 mm Hg) or standard treatment (≤145 mm Hg) with antihypertensive therapies.

The researchers found that goal blood pressures were achieved after a median treatment period of three to four months. At this time, the mean 24-hour systolic blood pressure was 127.7 mm Hg in the intensive-treatment group and 144.0 mm Hg in the standard-treatment group. There was no difference noted between the treatment groups with respect to changes in gait speed or cognitive outcomes. From baseline, changes in white matter hyperintensity volumes were smaller (0.29 percent) in the intensive-treatment group versus the standard-treatment group (0.48 percent). There were more major adverse cardiovascular events in the standard-treatment group versus the intensive-treatment group (17 versus four patients). The treatment groups were similar with respect to number of falls (with or without injury) as well as syncope.

"After three years, intensive treatment levels of ambulatory blood pressure did not show lessening of mobility or cognitive decline compared with standard treatment levels; however, less accrual of white matter disease was observed in those with intensive treatment," the authors write.

This article was published on November 4, 2019.
Numerous studies have established that oral health can play a significant role in systemic health. A new review study has found that this relationship actually grows in importance with age, and that oral health vigilance is especially critical for the elderly.

Researchers from the University of Connecticut (UConn) conducted the review, which outlines how poor oral health in older adults can potentially lead to other health complications. The researchers identified several groups that could be at a higher risk of developing oral health problems, including individuals with dementia or diabetes, and those in long-term care situations.

Previously published data from the National Center for Health Statistics has indicated that the prevalence of cavities might be more than twice as high in older adults compared with younger adults. Furthermore, according to the Centers for Disease Control and Prevention, about 68% of American adults aged 65 years or older have periodontitis.

“Your mouth is a mirror to your body,” said Dr. Sree Raghavendra, assistant professor in the Department of Craniofacial Sciences in the Division of General Dentistry at the UConn School of Dental Medicine and co-author of the review. “This article is a prime example of true interprofessional collaboration that emphasizes the importance of the entire health care team coming together to take care of all of our patients and especially our geriatric population.”

The study, titled “The prevention of infections in older adults: Oral health,” was published online on Sept. 3, 2019, in the Journal of the American Geriatrics Society, ahead of inclusion in an issue.
Researchers at the University of Connecticut School of Dental Medicine say they are a step closer to understanding the root causes of oral mucositis that occurs after chemotherapy, with direct evidence that the oral microbiome could influence its clinical course.

Oral mucositis, a common side effect of chemotherapy, is triggered by chemotherapeutic drugs breaking down the mucous membrane lining the mouth. This breakdown induces the painful lesions.

“Oral mucositis due to chemotherapy can impact the delivery of optimal cancer treatment,” said Patricia Diaz, DDS, MS, PhD, associate professor in the Department of Oral Health and Diagnostic Sciences and the study’s lead investigator.

“These uncomfortable oral lesions can be associated with clinically significant pain in patients and impact their ability to eat. In extreme cases, a patient’s risk of bloodstream infections is elevated, and they are at increased length and cost of hospitalization,” said Diaz.

While this chemotherapy complication has not been widely researched, it has been suggested that the oral microbiome plays a role in inducing the responses that lead to mucositis. Diaz’s study tracked 49 patients receiving treatment for cancers not located in the mouth during one chemotherapy cycle.

The researchers found that oral mucositis is associated with detrimental changes in the oral microbiome. Patients who developed the most severe oral mucositis lesions showed suppression of beneficial mouth bacteria and outgrowth of harmful ones.

However, it remains unknown if the oral microbiome itself is disrupted during the chemotherapy. Further research studies are needed to understand which specific microbiome components are detrimental and in what manner they affect the oral mucosa’s ability to withstand a chemotherapy challenge, the researchers said.

The findings also can shed light on new preventive approaches to stop the lesions from developing, the researchers said. As of now, some evidence suggests that an antimicrobial mouth rinse such as chlorhexidine has some benefits in preventing chemotherapy-associated mucositis, but Diaz says more research is needed.
is needed to develop more effective preventive measures.

“We need to design more targeted preventive strategies aimed at these detrimental microorganisms,” said Diaz. “Since chemotherapeutics are the primary cause of mucosal injury, it is also likely that these microbiome-targeted therapies need to be combined with other treatments to prevent cell death and inflammation at the oral mucosa.”

The study, “Chemotherapy-Induced Oral Mucositis Is Associated With Detrimental Bacterial Dysbiosis,” was published by *Microbiome*.

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**RESEARCHERS TO INVESTIGATE ROLE OF LIPIDS IN PERIODONTITIS**

*Dentistry Today*

*Researchers at the University of Connecticut School of Dental Medicine* have received a $1.5 million, four-year grant from the National Institute of Dental and Craniofacial Research to study the role of certain bacterial lipids in promoting bone loss in periodontal disease.

As the microorganisms that accumulate between the gum and tooth root die, they become entombed in a mineral matrix called subgingival calculus. Deposited in this matrix and within the overlying microbial plaque are specific microbial factors that can penetrate into gum tissue.

The body recognizes these factors as a signal for help and mounts a localized chronic inflammatory response that can damage gum tissues and the bone supporting the teeth. The bacterial factors that are most important to this process are novel bacterial lipids that engage with the immune system.

*Porphyromonas gingivalis* is prominent in the subgingival plaque at periodontitis sites. Along with other organisms of the same phylum, it produces novel lipids that engage the immune system.

Previously, these researchers found that *P gingivalis* produces two unique...
classes of serine lipids that inhibit bone formation and activate immune cells. These macrophages then release important cytokines that signal to the rest of the immune system to send help to an area of the body battling infection, in this case, the gums and teeth.

At least one of these serine lipids mediates its effects by engaging the host’s innate immune system, specifically by interacting with Toll-like Receptor 2 (TLR2). This membrane protein recognizes foreign substances, thereby alerting the immune system to their presence. The researchers now are looking to gain a better understanding of how these lipids promote the cellular effects spurred by engaging TLR2.

The researchers also have discovered another class of structurally related lipids in P gingivalis, called glycine lipids, that also engage TLR2. The glycine lipids appear to be very potent in their capacity to mediate TLR2 effects.

P gingivalis lipids are unique in that they can be produced from the previously mentioned serine lipids that enter gum tissues. Enzymes present in gum tissue cells mediate the hydrolytic breakdown of the serine lipids.

One enzyme class called phospholipase A2 is found in elevated levels in gum tissues where chronic periodontitis exists. This enzyme class mediates one step in the hydrolysis of serine lipids into glycine lipids. The hydrolysis of serine lipids to glycine lipids therefore occurs where the host-mediated chronic inflammatory response is most prominent.

The research will quantify the uptake of serine and glycine lipids by the dominant cells in gum tissues. It next will look at the ability of the lipids produced by P gingivalis to interact with important immune system receptors like TLR2 in gum cells.

The final goal of the research will be to determine the capacity of these bacterial lipids to promote the formation and activation of osteoclasts, the cells that mediate the degradation of bone associated with pathogen accumulation in the gingival crevice.

Also, the research will clarify how P gingivalis promotes TLR-2 dependent bone loss in periodontal diseases. It could lead to the development of treatments to prevent the progression of periodontitis or to help restore gum tissues and bone lost through the progression of gum disease, the researchers said.
Researchers at the University of Connecticut are collaborating with drug design firm Cellix Bio to develop a long-acting topical anesthetic that may replace current methods for treating oral mucositis, a common and painful side effect of cancer treatment that affects nearly 400,000 people in the United States each year.

Occurring after chemotherapy and radiation therapy, oral mucositis involves intensely painful sores in the mouth that can cause difficulties in talking, swallowing, and eating. It can become so severe that patients may require feeding intravenously or through a stomach tube. Poor nutrition can then lead to other problems for people who are already immunocompromised.

In addition to weight loss, these patients also may heal more slowly, have decreased resistance to infection, and experience a general failure to thrive. Secondary infection and potentially life-threatening sepsis also have been reported.

"While the pain that oral mucositis causes is certainly of great concern, perhaps the most harmful impact occurs when patients are in such extreme agony that their attending physicians have no choice but to prescribe undesirable dose reductions or treatment breaks in cancer therapy," said Rajesh Lalla, DDS, PhD, professor of dental medicine at UConn Health.

“It would then come as no surprise that such modifications can spell less than optimal results for treating a patient’s cancer. Finding a better way to treat oral mucositis could help clinicians and patients better battle their primary cancer diagnosis,” said Lalla.

Current first-line therapy is a mouth rinse containing lidocaine. For best results, patients swish for about two minutes to experience only about 30 minutes of relief. The rinse also numbs the entire mouth instead of focusing specifically on the oral mucositis sores, which poses safety concerns since it can inhibit the swallowing reflex.

Many patients, then, are prescribed systemic opioids to treat pain from oral mucositis, which Lalla equates to hanging a picture with a sledge hammer.

“While it might get the job done, it is probably overkill and could certainly cause unnecessary damage,” said Lalla.

With the help of Diane J. Burgess, PhD, of the UConn School of Pharmacy, Lalla and his collaborators say they are close to replacing the “sledge hammer” with a more precise and effective treatment option that doesn’t include risk of addiction or abuse.
Thanks to lab work conducted by Tingting Li, a PhD student in Burgess’ lab, the researchers have developed a formulation and patented compound that delivers co-actives, a long-lasting topical anesthetic, and a medium chain fatty acid that can be applied directly to sores with a specially designed spray nozzle. This means the medication can be targeted to lesions rather than the whole mouth, allowing relief without generalized numbness.

Starting out as a liquid, the anesthetic turns into a gel when it comes into contact with the mouth and reaches the temperature of the human body. It then can stay in place on mouth sores. Since it uses an anesthetic that is more potent than lidocaine, the researchers expect it to relieve pain for about eight times as long as the standard rinse, or about four hours.

The compound also exhibits antimicrobial and anti-inflammatory effects naturally delivered by the medium chain fatty acid, which could reduce the severity of lesions from oral mucositis, said Lalla. While the researchers believe they are about a year or two away from clinical trials in humans, they are excited about its life-changing potential.

“We knew that there was a huge unmet need, that the market was wide open, and that significant data indicated this molecule was an excellent candidate,” said Mahesh Kandula, CEO and managing director of Cellix Bio.

“We are thrilled to be collaborating with such qualified researchers like Drs. Burgess and Lalla from UConn. We are confident this partnership will lead not only to successful commercialization, but also to a better prognosis for thousands of patients undergoing treatment for cancer.”
Patient-reported symptoms of psoriasis, quality of life, and work productivity worsen with increasing disease severity, as measured by two established clinician assessment tools, according to a study published online April 20 in BMJ Open.

Bruce Strober, M.D., Ph.D., from the University of Connecticut Health Center in Farmington, and colleagues examined the association between psoriasis severity, assessed by body surface area (BSA) and the Investigator's Global Assessment (IGA), and patient-reported outcomes among 1,529 adult patients with psoriasis in the Corrona Psoriasis Registry. Patients were being treated with biological or nonbiological systemic psoriasis medications in a real-world setting. Previously, the IGA has only been used in clinical trials.

The researchers found that with more severe psoriasis, symptoms worsened, Dermatology Life Quality Index scores increased (P < 0.05 for each level of BSA and IGA), and Work Productivity and Activity Impairment (WPAI) scores increased consistently. Moderate to very severe psoriasis using BSA score was associated with poorer outcomes for the “impairment while working” and “daily activities impaired” WPAI domains (all P < 0.05 versus mild psoriasis). An association was noted between very severe psoriasis and increased “work hours missed” and “work hours affected” (both P < 0.05 versus mild psoriasis). Using IGA, findings were similar.

“Increased psoriasis severity as measured by both BSA and IGA categories was associated with worsened patient-reported outcomes in this USA-based psoriasis registry study,” the authors write.

Several authors disclosed financial ties to pharmaceutical companies, including Corrona and Novartis, which funded the study.
Physicians received new information about their patients with psoriasis by employing the Psoriasis Symptom Inventory, a patient-reported measure of signs and symptoms, according to a study in *American Journal of Clinical Dermatology*.

The Psoriasis Symptom Inventory (PSI) may be particularly useful in patients with severe disease and aid physicians with decision-making. The PSI could also be indicative of the amount of time that may be required for a particular patient visit, the researchers wrote.

“Despite the greater amount of time spent discussing the PSI in patients with more severe disease, physicians treating those patients reported an influence of the PSI discussion on treatment decisions,” Bruce Strober, MD, PhD, professor of dermatology at the University of Connecticut Health Center, and colleagues wrote.

The patient-reported measure quantifies the perception of psoriasis signs and symptoms through an 8-item questionnaire on itching, redness, scaling, burning, stinging, cracking, flaking and pain, with a scale of 0 (not at all) to 3 (very severe) and a score ranging from 0 to 32.

The clinics enrolled 278 adults with mild to severe psoriasis (57.9% men; mean age, 47.5 years).

Mild psoriasis was identified in 47.8% (range, 40% to 67.5%), moderate psoriasis in 29.1% (range, 12.5% to 40%) and severe psoriasis was found in 23% (range, 17.5% to 42.9%).

The researchers reported a static Physician’s Global Assessment (sPGA) score, across of all patients, of 0 to 1 (clear or almost clear) in 18.7% (range, 2.9% to 28.6%), an sPGA score of 2 to 3 (mild to moderate) in 67.3% (range, 42.9% to 91.4%) and an sPGA score of 4 to 5 (severe to very severe) in 14% (range, 0% to 37.1%).

The mean PSI total score for all patients was 12.2 (standard deviation, 8.3). Higher mean PSI scores were reported from study sites that had a greater number of patients with severe disease.

Based on PSI score, 107 (38.5%) patients had no/mild symptoms, 89 (32%) had moderate symptoms, 57 (20.5%) had severe symptoms and 25 (9%) had very severe symptoms.

As for the time to complete the survey, it had a low time constraint, according to...
Researchers with the University of Connecticut (UConn) School of Dental Medicine developed a technology platform that allows them to record cells communicating in real time. They published their research in the journal Proceedings of the National Academy of Sciences.

Cells are constantly in communication with each other. They do this by secreting proteins. When those proteins reach other cells, it changes the cells’ behavior.

Two examples of cell communication come to mind. The first is the burgeoning field of microbiomics. The microbiome is

Disclosures: Strober reports he serves as a consultant for AbbVie, Almirall, Amgen, AstraZeneca, Celgene Corp., Dermira, Janssen Global Services, Eli Lilly & Co., GlaxoSmithKline, LEO Pharma, Medac Pharma Inc., Menlo Therapeutics, Novartis AG, Pfizer Inc., Sun Pharma, UCB, and Ortho Dermatologics/Valeant Pharmaceuticals; is an investigator for AbbVie, Boehringer Ingelheim, Celgene Corp., Eli Lilly & Co., Galderma, Janssen Global Services, Merck & Co., and Sienna Biopharmaceuticals; and is scientific director for Corrona Psoriasis Registry and has received grant support to the University of Connecticut Fellowship Program from AbbVie and Janssen Global Services.
the trillions of bacteria, viruses and fungi that live in the human body. It’s obvious that this plays a role in gastrointestinal diseases, but more recent research shows that how these different types of microorganisms communicate throughout the body plays a much broader role in a variety of diseases.

For example, in March 2019, Seres Therapeutics inked a three-year research deal with AstraZeneca. The two companies will focus on microbiome-based approaches to predict which patients will respond best to specific cancer treatment. They are also planning to investigate SER-401, an investigational microbiome treatment in combination with AstraZeneca cancer drugs.

Another example of cell-to-cell communication is the underpinning of immuno-oncology therapies that are revolutionizing cancer treatments. Tumors often have a surface protein called PD-L1. T-cells, a type of immune cell, have a surface protein called PD1. When PD-L1 interacts with PD1, it essentially tells the T-cells to ignore the cancer cells. By blocking that interaction using checkpoint inhibitors that block either PD-L1 (Merck’s Keytruda, for example) or PD (Bristol-Myers Squibb’s Opdivo), they allow the T-cells to see and attack the cancer cells.

Current technology paints a picture of these types of interactions, sometimes indirectly. But the researchers at UConn, developed a way to directly analyze the interactions. They focused on stem cells from bone marrow that can be used to treat heart attacks. Using their technology platform, a combination of microfluidics and computer modeling, they were able to record in depth the communications between the stem cells and were able to copy the stem cells’ specific behavior.

“The findings solve a fundamental problem afflicting systems biology: measuring how cells communicate with each other,” stated Yashir Suhail, a postdoctoral fellow in the UConn Dental School’s Department of Biomedical Engineering. “The platform technology will open new lines of inquiry into research, by providing a unique way to detect how cells talk to each other at a deeper level than what is possible today.”

Part of what the researchers found was the flexibility of stem cells, which allowed them to change their behavior depending on what types of cellular injury were present. They were then able to develop a “cell-less” therapy by copying the stem cells’ behavior when stem cells find a tissue injury. They created a protein cocktail that helped repair cardiac tissue. They believe it may potentially decrease many of the complications associated with stem cell transplantation.

The research was funded by the American Heart Association and the National Cancer Institute. It was led by Kshitiz Gupta, an assistant professor at UConn with assistance with researchers from Yale University, The Johns Hopkins School of Medicine, the University of California, San Francisco, and the University of Vermont.
School of Business
In 2016, Didi became the world’s largest ride-sharing company, reaching 25 million trips a day in China and surpassing the combined daily trips of all other ride-sharing companies across the globe. It had arrived at this milestone by merging in 2015 with its domestic rival, Kuaidi, and pushing Uber out of the Chinese market after a fierce, expensive battle. With its competition gutted, Didi gradually began to improve its margins by reducing subsidies to drivers and passengers.

But just as the company began to reach profitability, in early 2018, Meituan, a giant player in online-to-offline services such as food delivery, movie ticketing, and travel booking, launched its own ride-hailing business in Shanghai. Meituan didn’t charge drivers to use its platform for the first three months and afterward took only 8% of their revenues, while Didi took 20%. Drivers and passengers flocked to the new service. In April, Didi struck back by entering the food delivery market in Wuxi, a city close to Shanghai. What followed was a costly price war, with many meals being sold for next to nothing because of heavy subsidies from both companies. So much for Didi’s profitability.

Didi was taking other hits too. In March 2018, Alibaba’s mapping unit—Gaode Map, the largest navigation service in China—had started a carpooling business in Chengdu and Wuhan. It didn’t charge drivers at all, and in July it began offering passengers the option of ordering from several ride-hailing services. Meanwhile, Ctrip, China’s largest online travel service, had announced in April that it had been granted a license to provide car-hailing services across the country.

Why hadn’t Didi’s immense scale shut down its competition for ride services in China? Why wasn’t this a winner-take-all market, as many analysts had predicted? Moreover, why do some platform businesses—such as Alibaba, Facebook, and Airbnb—flourish, while Uber, Didi, and Meituan, among others, hemorrhage cash? What enables digital platforms to fight off competition and grow profits?

To answer those questions, you need to understand the networks a platform is embedded in. The factors affecting the growth and sustainability of platform firms (and digital operating models generally) differ from those of traditional firms. Let’s start with the fact that on many digital networks the cost of serving an additional user is negligible, which makes a business inherently profitably.
easier to scale up. And because much of a network-based firm's operational complexity is outsourced to the service providers on the platform or handled by software, bottlenecks to value creation and growth usually aren't tied to human or organizational factors—another important departure from traditional models. Ultimately, in a digital network business, the employees don't deliver the product or service—they just design and oversee an automated, algorithm-driven operation. Lasting competitive advantage hinges more on the interplay between the platform and the network it orchestrates and less on internal, firm-level factors. In other words, in the digitally connected economy the long-term success of a product or service depends heavily on the health, defensibility, and dominance of the ecosystem in which it operates.

And as Didi is learning, it's often easier for a digital platform to achieve scale than to sustain it. After all, the advantages that allow the platform to expand quickly work for its competitors and anyone else who wants to get into the market. The reason that some platforms thrive while others struggle really lies in their ability to manage five fundamental properties of networks: network effects, clustering, risk of disintermediation, vulnerability to multi-homing, and bridging to multiple networks.

Strength of Network Effects
The importance of network effects is well known. Economists have long understood that digital platforms like Facebook enjoy same-side (“direct”) network effects: The more Facebook friends you have in your network, the more likely you are to attract additional friends through your friends' connections. Facebook also leverages cross-side (“indirect”) network effects, in which two different groups of participants—users and app developers—attract each other. Uber can similarly mine cross-side effects, because more drivers attract more riders, and vice versa.

Less well acknowledged is the fact that the strength of network effects can vary dramatically and can shape both value creation and capture. When network effects are strong, the value provided by a platform continues to rise sharply with the number of participants. For example, as the number of users on Facebook increases, so does the amount and variety of interesting and relevant content. Video game consoles, however, exhibit only weak network effects, as we discovered in a research study. This is because video games are a hit-driven business, and a platform needs relatively few hits to be successful. The total number of game titles available isn’t as important in console sales as having a few of the right games. Indeed, even an entrant with only a small technical advantage (and a good business development team) can steal significant market share from incumbents. That explains why in 2001 Microsoft’s new Xbox posed such a threat to Sony’s then-dominant PlayStation 2, and why each console has gone up and down in market share, alternately taking the lead, over the years.

Even more critically, the strength of network effects can change over time. Windows is a classic example. During the heyday of personal computers in the 1990s, most PC applications were “client based,” meaning they actually lived on the computers. Back then, the software’s network effects were strong: The value of Windows increased dramatically as the number of developers writing apps for it climbed, topping 6 million at the peak of its popularity. By the late 1990s Windows seemed entrenched as the leading platform. However, as internet-based
apps, which worked across different operating systems, took off, the network effects of Windows diminished and barriers to entry fell, allowing Android, Chrome, and iOS operating systems to gain strength on PCs and tablets. Mac shipments had also begun to rise in the mid-2000s, increasing more than five-fold by the end of the decade. This turn of events illustrates that when an incumbent’s network effects weaken, so does its market position.

It is possible for firms to design features that strengthen network effects, however. Amazon, for example, has built multiple types of effects into its business model over the years. In the beginning, Amazon’s review systems generated same-side effects: As the number of product reviews on the site increased, users became more likely to visit Amazon to read the reviews as well as write them. Later, Amazon’s marketplace, which allows third parties to sell products to Amazon users, generated cross-side network effects, in which buyers and third-party sellers attracted each other. Meanwhile, Amazon’s recommendation system, which suggests products on the basis of past purchase behavior, amplified the impact of the company’s scale by continually learning about consumers’ preferences. The more consumers used the site, the more accurate the recommendations Amazon could provide them. While not usually recognized as a network effect per se, learning effects operate a lot like same-side effects and can increase barriers to entry.

Network Clustering

In a research project with Xinxin Li of the University of Connecticut and Ehsan Valavi, a doctoral student at Harvard Business School, we found that the structure of a network influences a platform business’s ability to sustain its scale. The more a network is fragmented into local clusters—and the more isolated those clusters are from one another—the more vulnerable a business is to challenges. Consider Uber. Drivers in Boston care mostly about the number of riders in Boston, and riders in Boston care mostly about drivers in Boston. Except for frequent travelers, no one in Boston cares much about the number of drivers and riders in, say, San Francisco. This makes it easy for another ride-sharing service to reach critical mass in a local market and take off through a differentiated offer such as a lower price. Indeed, in addition to its rival Lyft at the national level, Uber confronts a number of local threats. For example, in New York City, Juno and Via, as well as local taxi companies, are giving it competition. Didi likewise faces a number of strong contenders in multiple cities.

Now let’s compare Uber’s market with Airbnb’s. Travelers don’t care much about the number of Airbnb hosts in their home cities; instead, they care about how many there are in the cities they plan to visit. Hence, the network more or less is one large cluster. Any real challenger to Airbnb would have to enter the market on a global scale—building brand awareness around the world to attract critical masses of travelers and hosts. So breaking into Airbnb’s market becomes much more costly.

It’s possible to strengthen a network by building global clusters on top of local clusters. While Craigslist, a classified ad site, primarily connects users and providers of goods and services in local markets, its housing and job listings attract users from other markets. Facebook’s social games (like FarmVille) established new connections among players who were strangers, creating a denser, more global, more integrated network, which is easier to defend from competition. Both Facebook and WeChat, a popular social-networking
app in China, have been enhancing their networks by getting popular brands and celebrities—those with national and often international appeal—to create public accounts and post and interact with users.

**Risk of Disintermediation**

Disintermediation, wherein network members bypass a hub and connect directly, can be a big problem for any platform that captures value directly from matching or by facilitating transactions. Imagine that you hire a house cleaner from a platform like Homejoy and are satisfied with the service. Would you really go back to Homejoy to hire the same person again? If a user has found the right match, there’s little incentive to return to the platform. Additionally, after obtaining enough clients from a platform to fill his or her schedule, the house cleaner won’t need that platform anymore. This was exactly the problem that doomed Homejoy, which shut down in 2015, five years after it was founded.

**Which Network Structure Is More Defensible?**

Some digital networks are fragmented into local clusters of users. In Uber’s network, riders and drivers interact with network members outside their home cities only occasionally. But other digital networks are global; on Airbnb, visitors regularly connect with hosts around the world.

Platforms on global networks are much less vulnerable to challenges, because it’s difficult for new rivals to enter a market on a global scale.

Platforms have used various mechanisms to deter disintermediation, such as creating terms of service that prohibit users from conducting transactions off the platform, and blocking users from exchanging contact information. Airbnb, for example, withholds hosts’ exact locations and phone numbers until payments are made. Such strategies aren’t always effective, though. Anything that makes a platform more cumbersome to use can make it vulnerable to a competitor offering a streamlined experience.

Some platforms try to avoid disintermediation by enhancing the value of conducting business on them. They may facilitate transactions by providing insurance, payment escrow, or communication tools; resolve disputes; or monitor activities. But those services become less valuable once trust develops among platform users—and the strategies can backfire as the need for the platform decreases. One of us, Feng, and Grace Gu, a doctoral student at Harvard Business School, saw this effect in a study of an online freelance marketplace. As the platform improved its reputation-rating system, trust between clients and freelancers grew stronger, and disintermediation became more frequent, offsetting the revenue gains from better matching.

Some platforms address disintermediation risks by introducing different strategies for capturing value—with varying results. Thumbtack, a marketplace connecting consumers with local service providers such as electricians and guitar teachers, charges for lead generation: Customers post requests on the site, and service providers send them quotes and pay Thumbtack fees if those customers respond. That model captures value before the two sides even agree to work together and has helped save the company from withering like Homejoy. Thumbtack today is handling over $1 billion worth of transactions annually. The downside of its revenue model is that it doesn’t prevent the two sides
from building a long-term relationship outside the platform after a match.

Alibaba took a different approach with its Taobao e-commerce platform. When Taobao entered the market, in 2003, eBay’s EachNet had more than 85% of the Chinese consumer-to-consumer market. However, Taobao didn’t charge listing or transaction fees and even set up an instant-messaging service, Wangwang, that allowed buyers to ask questions directly of sellers and haggle with them in real time. In contrast, EachNet charged sellers transaction fees and, because it was concerned about disintermediation, didn’t allow direct interactions between buyers and sellers until a sale had been confirmed. Not surprisingly, Taobao quickly took over leadership of the market, and at the end of 2006, eBay shut down its Chinese site. Taobao today continues to offer its C2C marketplace services free of charge and captures value through advertising revenues and sales of storefront software that helps merchants manage their online businesses.

After estimating that it could lose as much as 90% of its business to disintermediation, the Chinese outsourcing marketplace ZBJ, which launched in 2006 with a model of charging a 20% commission, began looking for new revenue sources. In 2014 it discovered that many new business owners used its site to get help with logo design. Typically, the next job those clients would need done was business and trademark registration, which the platform started to offer. Today ZBJ is the largest provider of trademark registration in China—a service that generates more than $70 million in annual revenue for the firm. The company has also significantly reduced its transaction fees and focused its resources on growing its user base instead of fighting disintermediation.

As the experience of ZBJ, which is now valued at more than $1.5 billion, shows, when disintermediation is a threat, providing complementary services can work a lot better than charging transaction fees.

Vulnerability to Multi-Homing

Multi-homing happens when users or service providers (network “nodes”) form ties with multiple platforms (or “hubs”) at the same time. This generally occurs when the cost of adopting an additional platform is low. In the ride-hailing industry, many drivers and riders use both, say, Lyft and Uber—riders to compare prices and wait times, and drivers to reduce their idle time. Similarly, merchants often work with multiple group-buying sites, and restaurants with multiple food-delivery platforms. And even app developers, whose costs are not trivial, still find it makes sense to develop products for both iOS and Android systems.

When multi-homing is pervasive on each side of a platform, as it is in ride-hailing, it becomes very difficult for a platform to generate a profit from its core business. Uber and Lyft are constantly undercutting each other as they compete for riders and drivers.

Incumbent platform owners can reduce multi-homing by locking in one side of the market (or even both sides). To encourage exclusivity, both Uber and Lyft gave bonuses in many markets to people who completed a certain number of trips in a row without rejecting or canceling any or going offline during peak hours. And while rides are in progress, both platforms provide drivers new requests for pickups very close to current passengers’ drop-off locations, reducing the drivers’ idle time and hence the temptation to use other platforms. Yet because of the inherently low cost
of adopting multiple platforms, multi-homing is still rampant in ride sharing.

Attempts to prevent multi-homing can also have unintended side effects. In one research project, Feng and Hui Li of Carnegie Mellon University examined what happened in 2011 when Groupon retooled its deal counter—which tracks the amount of people who have signed up for a specific offer on its site—to show ambiguous ranges, rather than precise numbers. It then became more difficult for LivingSocial to identify and poach the popular merchants on Groupon. As a result, LivingSocial started to source more exclusive deals. While Groupon was able to reduce merchant-side multi-homing, the research found, consumers became more likely to visit both sites, because there were fewer overlapping deals on them, and it cost little to multi-home. That finding points to a key challenge platform firms face: Reducing multi-homing on one side of the market may increase multi-homing on the opposite side.

Other approaches seem to work better. Let’s look again at the video game industry: Console makers often sign exclusive contracts with game publishers. On the platforms’ user side, the high prices of consoles and subscription services, such as Xbox Live and PlayStation Plus, reduce players’ incentives to multi-home. That finding points to a key challenge platform firms face: Reducing multi-homing on one side of the market may increase multi-homing on the opposite side.

Network Bridging

In many situations the best growth strategy for a platform may be to connect different networks to one another. In any platform business, success hinges on acquiring a high number of users and amassing data on their interactions. Such assets can almost invariably be valuable in multiple scenarios and markets. By leveraging them, firms that have succeeded in one industry vertical often diversify into different lines of business and improve their economics. This is a fundamental reason why Amazon and Alibaba have moved into so many markets.

When platform owners connect with multiple networks, they can build important synergies. Alibaba successfully bridged its payment platform, Alipay, with its e-commerce platforms Taobao and Tmall, providing a much-needed service to both buyers and sellers and fostering trust between them. Alibaba has also taken advantage of transaction and user data from Taobao and Tmall to launch new offerings through its financial services arm, Ant Financial—including a credit-rating system for merchants and consumers. And information from that rating system allowed Ant Financial to issue short-term consumer and merchant loans with very low default rates. With those loans, consumers can purchase more products on Alibaba’s e-commerce platforms, and Alibaba’s merchants can fund more inventory. These networks mutually reinforce one another’s market positions, helping each network sustain its scale. Indeed, even after the rival platform Tencent offered a competing digital wallet service, WeChat Pay, through its app WeChat, Alipay remained attractive to consumers and merchants because of its tight bridging with Alibaba and Ant Financial’s other services.
As the most successful platforms connect across more and more markets, they’re becoming increasingly effective at tying together industries. Just as the Alibaba Group moved from commerce to financial services, Amazon has moved beyond retail to entertainment and consumer electronics. Platforms are thus becoming crucial hubs in the global economy.

**Conclusion**

When evaluating an opportunity involving a platform, entrepreneurs (and investors) should analyze the basic properties of the networks it will use and consider ways to strengthen network effects. It’s also critical to evaluate the feasibility of minimizing multi-homing, building global network structures, and using network bridging to increase scale while mitigating the risk of disintermediation. That exercise will illuminate the key challenges of growing and sustaining the platform and help businesspeople develop more-realistic assessments of the platform’s potential to capture value.

As for Didi and Uber, our analysis doesn’t hold out much hope. Their networks consist of many highly local clusters. They both face rampant multi-homing, which may worsen as more rivals enter the markets. Network-bridging opportunities—their best hope—so far have had only limited success. They’ve been able to establish bridges just with other highly competitive businesses, like food delivery and snack vending. (In 2018 Uber struck a deal to place Cargo’s snack vending machines in its vehicles, for instance.) And the inevitable rise of self-driving taxis will probably make it challenging for Didi and Uber to sustain their market capitalization. Network properties are trumping platform scale. ●
THE 30-SECOND TRICK THAT CAN MAKE ANYONE MORE CREATIVE

“The reason it works is because empathizing, or thinking about someone in an emotional way, leads to more cognitive flexibility,” says professor Kelly Herd.

By Mark Wilson

If you’re designing a new product or marketing campaign, what’s the better source of creativity: Your brain or your heart? That’s a question posed by the University of Connecticut and the University of Illinois in a new study published in the Journal of Consumer Research.

Their conclusion? It’s your heart. It’s more important to think about how your audience or users feel than how they might act. And once you know that, you can actually change your own thinking to be more creative.

“A lot of people are told to be very objective. ‘You’re a professional. Think about this in an objective way. Don’t get caught up in emotions,’” says Kelly Herd, marketing professor at the University of Connecticut. “But what we find is that [the empathetic] process actually leads to more creativity.”

Over a series of five separate trials, Herd and co-author Ravi Mehta asked everyday people to conceptualize new products, like toys for children, grocery carts for the elderly, and new flavors of potato chips for pregnant women. Crucially, half of participants were instructed to think about these problems cognitively—to consider logical solutions. The other half of participants were instructed to close their eyes for 30 seconds and empathize with the end user, to try to feel what they were going through, before beginning the design.

Across trials and tasks, the empathetic designers were found to be measurably the most creative (the results were judged by various independent panels), and crucially, their ideas were no less practical than the logical group. In other words, their creative ideas didn’t come at the expense of realism.

For instance, when prompted to come up with potato chip flavors for pregnant women, the cognitive thinkers came up with flavors like “salt” and “BBQ.” But the empathetic thinkers thought up with flavors like pickles and ice cream, sushi with wasabi, and something called “margarita for mom.” Sushi and margaritas are not just surprising choices, they’re both foods that most pregnant women abstain from for nine months.
But why is empathy such an effective creative tool? Is it that when you begin to think about someone's feelings you just care about them more and work harder? No, says Herd. In fact, the study controlled for that possibility.

“The reason it works is because empathizing, or thinking about someone in an emotional way, leads to more cognitive flexibility,” says Herd. “Cognitive flexibility comes in when thinking about new ideas and new pieces of information as you brainstorm.” Basically, that mental agility helps you consider many possibilities and iterate on ideas more fluidly.

“Empathy actually just makes you better and more cognitively efficient. And that to me is way cool,” says Herd. “If you want to motivate people to be more creative, there’s lots of reach on that. We’re saying you don’t spend any more time or more energy; just do it better.”

So how can you leverage empathy to be more creative? Herd recommends a simple practice. Just spend 30 seconds or a minute thinking about someone else and how they must feel—that can be anyone from the user for your next product, to a relative for whom you need to buy a Christmas gift.

“I think it can actually be pretty quick,” says Herd. “It’s not like you need to sit back and think about this for an hour to get that benefit. Just taking a moment can shift your thinking.”
WANT TO BE MORE PERSUASIVE? A NEW STUDY SAYS DO THIS 1 SIMPLE THING

Please just follow the guidance. Thank you.

By Bill Murphy Jr.

Time is sometimes short. When you’ve got something important to say, you want to make it stick.

Now, a new study published in the journal MIS Quarterly suggests a simple adjustment some people make (or maybe that they do automatically), that makes their arguments seem more persuasive.

It’s called “the politeness bias,” and it’s a bit surprising.

The researchers -- Shun-Yang Lee of the University of Connecticut, Huaxia Rui of the University of Rochester, and Andrew Whinston of the University of Texas at Austin -- studied conversations on Stack Exchange, which is a network of question-and-answer websites and communities.

The key thing they found: The more polite an answer was, the more likely it was to be rated highly and chosen as the “best answer.”

It’s not ironclad. If the person offering an opinion is perceived as a true expert, that can overcome an impolite response, the researchers said.

But all other things being equal, impolite answers were less likely to be regarded as correct.

Here’s an example of the kinds of answers we’re talking about, cited in a summary by Cornell University’s Amy Newman, each provided below in reply to someone in a conversation by Amazon Mechanical Turk workers asking how to transfer their earnings into their bank accounts:

Polite answer: “Based on the explanation in the worker platform instruction, one will need to specify the amount s/he would like to transfer. This amount should not be greater than what is available for transfer. If this is the first time transferring, then bank information, such as routing and account numbers, is also required.

Impolite answer: You need to check the worker platform instruction more carefully before posting the question, as the answer can be found there very easily. Just go to the Earnings page and enter the amount you wish to transfer (make sure this amount is not greater than what is available for transfer.) Just remember that if it’s your first time...
transferring money to a bank account you will also need to enter your bank account information (routing and account numbers) otherwise AMT won’t know where to transfer the money to.

In both cases the actual substance of the answers is almost identical, but the first one -- the one that doesn’t include the condescending recommendation that the person asking the question check the instructions more carefully before asking -- winds up rated higher.

So, a few takeaways:
We’re talking about a single website here, and written communications only. That said, it’s a situation in which the people asking the questions and the people answering them don’t automatically know anything else about each other. So that should eliminate some other biases.

All other things being equal, it seems to be a matter of tone more than simply using polite words like please and thank you, although those don’t seem to hurt.

In the case of a website like Stack Exchange, the “politeness bias” is a problem, as they don’t want answers to be perceived as more correct simply because they’re more polite. One solution might be to give less consideration to how the people who ask the question feel about the answers, as opposed to other independent readers.

As Peter Coy at Bloomberg reports, Stack Exchange is actually moving in that direction already, as the answer that a questioner selects as the best answer is now called “accepted,” instead of “best answer.”

The whole thing reminds me of the classic debate over whether it’s a good thing to teach people to be more persuasive, because inevitably some people who are incompetent or have indecent motives will use the persuasiveness techniques to spread wrong or malicious ideas.

But I don’t know what to do about that. In the meantime, if you want to spread good ideas, all other things being equal, use polite language and don’t insult the people you’re trying to convince. ●
Corporations are increasingly relying on federally-supported research for innovation, according to a new study.

Nearly one-third of patents in the U.S. rely on federal research investment, according to the study, which was recently published in the journal *Science*. Researchers from UC Berkeley, the University of Connecticut, Boston University and Harvard University looked at links between government grants and patents from between 1926 and 2017.

The number of patents that relied on federal research “increased steadily” over that time, mainly beginning after World War II, researchers said. And while the percentage of new patents involving federal support has remained about the same since 2011, the number of patents that relied on federally-supported research nearly doubled between 2008 and 2017, from 22,647 to 45,220.

Also, patents that rely on federal research are considered more important, judging by their future citations, renewal rates and novel terminology, according to the study.

“Technological progress is seen as a process through which inventions build on one another,” Hillary Greene, a law professor at UConn and one of the study’s authors, said in an online statement. “In this study, we examine the importance of government-supported research as contributing to subsequent inventions.”

In some fields, federal funding played an even greater role in patents. For example, close to 60 percent of patents in chemistry and metallurgy rely on federally-supported research.

Federal funding for science has repeatedly faced large cuts, the researchers noted. They said those cuts “might endanger the innovation that increasingly fuels the modern economy.”

The authors of the study said this was the first of its kind to illustrate how much of patenting in the U.S. has relied on federal science funding.

“This research is an effort to detect, in a more nuanced way, the myriad fingerprints that U.S. federal research leaves, directly and indirectly, on innovation by others,” Greene said.
“We hope that it provides insights for the government, corporations and citizens about where this funding goes and the downstream impact it has on innovation,” Greene said. “And let’s not forget, that does not include the social and economic impact of federally-supported research — but that’s for another day.”

COMBAT TROOPS AT HIGHER RISK FOR OPIOID AND HEROIN ABUSE, STUDY SAYS

By Louis Casiano

American troops exposed to combat face a higher risk of abusing heroin and prescription opioids than service members who weren’t, according to a paper published last month by the National Bureau of Economic Research.

The study, titled “Did the War on Terror Ignite an Opioid Epidemic?,” concluded that opioid abuse among veterans who saw combat was 7 percentage points higher than those who were deployed but never engaged with the enemy.

The authors also noted that heroin use among the same group of veterans was 1 percentage point higher than those who didn’t see action.

Resul Cesur, associate professor of healthcare economics at the University of Connecticut, told Military Times he and his colleagues wanted to understand the relationship between nearly two decades of war with veterans and the opioid crisis.

Oxycontin Maker Negotiating $10 to $12 Billion Opioid Settlement With State, Local Governments: Report

Staff Sergeant Matthew Pick, 66th Security Forces Squadron, holds a nasal
applicator and naloxone medication vial, designed to temporarily reverse the effects of an opioid overdose at Hanscom Air Force Base, Mass. Hanscom is the first U.S. Air Force installation to issue the drug to law enforcement personnel under permission of the base commander. (U.S. Air Force photo by Mark Herlihy)

“We have an opioid epidemic in the military population. That is well known. And nearly three million deployed since 9/11, so what is the impact of this combat?” Cesur asked. “We wanted to know if it was driven by combat or by some other selection factor. For example, are people who are prone to opioid abuse drawn to enlist? ... Our evidence shows strong evidence that the reason why so many military people are using opiates is because they are exposed to combat.”

Cesar noted about a third of opioid abuse among the military and veteran communities stems from injuries suffered during war. Nearly 58 percent of heroin abuse was also linked to war injury, they found.

Opioid Doctors Warned Against Abruptly Ending Treatment for Pain Patients

Many veterans have been prescribed opioids upon being discharged from a hospital and many continued to take them for a prolonged period, the study concluded.

The Department of Veterans Affairs reported in 2015 that it saw a 55 percent rise in opioid use among Iraq and Afghanistan war veterans, according to the Times. Between 2010 and 2016, nearly 6,500 hundred veterans in the VA health care system died of opioid-related causes.

In fiscal year 2016, the VA reported treating around 68,000 veterans for opioid addiction.

Among active military members, The Army and Marine Corps had the highest rates of heroin use, followed by the Navy and Air Force. However, drug use in the military is still relatively rare.

The study comes at a time when many opioid manufacturers are facing scrutiny over their role in exacerbating the opioid epidemic that has killed thousands and ravaged communities. Multiple states and communities are suing Purdue Pharma -- maker of OxyContin -- over the pharmaceutical giant’s aggressive marketing model for drugs that netted the company billions.

On a positive note, the study’s researchers said pain medication prescriptions, opioid-related hospitalization stays and age-adjusted opioid death rates dropped in states where medical marijuana is legal, the Times reported.

“While marijuana legalization is certainly not a silver bullet, evidence that marijuana and opioids are substitutes suggests that access to medical marijuana may provide an alternative, less addictive, and less unhealthy means of treating pain,” they wrote.
WHY IT PAYS TO HAVE GEN Z WOMEN ON BUSINESS TEAMS

By Jennifer Openshaw

For most CEOs, HR partners and operations directors who have never given much thought to Gen Z, those born between 1995-2010, data from a new report should be their wake-up call: Pay attention to the “innovation generation” if you want to drive growth and global competitiveness.

The report, released in a live briefing with leaders from KKR, the NASDAQ and accounting firm EY, is based on six years of data analyzed from student business plan competitions held at UCLA, Rice University and the University of Connecticut. At these schools, like many others, students are provided real-world learning opportunities to develop business ventures and compete for prize money – ranging from $3,000 to $100,000 – based on the viability of their plans.

Although women comprise just 22 percent of participants in these business competitions, 51 percent of the ranking teams (placing first, second or third) were comprised of a woman founder.

And more to the point, among the first-place winning teams, 32 percent had a woman CEO.

It’s about strategy

David Noble, professor and director of the Werth Institute for Innovation and Entrepreneurship at the University of Connecticut, said the study shows that “women are less likely to get involved in entrepreneurial programming before they have a well thought-out idea and team. They’re waiting to a later point to show up and get involved.”

How can you recruit, motivate and empower Gen Z, also know as NextGen, women in the workforce?

Include NextGen women on teams

It’s not enough to have women in your firm; be sure they’re involved in innovation and meetings. They are highly ambitious and look for purpose in their work.

Despite inequality in access to capital, EY found that 30 percent of women-led companies are targeting growth rates in excess of 15 percent over the next 12 months, while their male counterparts will see only 5 percent growth.

Invest in STEEM, not just STEM Education

STEM creates the doers, but the extra “E”
for entrepreneurship that will foster the development of leaders with mindsets that will enable them to navigate the future of work.

Jackie Taylor, a partner at EY, says her firm is advising companies to embrace “intrapreneurship” — the concept of harnessing entrepreneurship, but within a traditional company — to drive innovation.

“Intrapreneurship is also a great way to engage and retain NextGen employees,” she added.

**The earlier women start, the better**

Jody Bell, 16, developed a business plan through Girls With Impact and then launched her venture, In Case of Deportation, to provide one-stop immigration deportation guidance for youth, by youth. She now has a giant leg-up for both her college and future business career.

“I can guarantee you that there are other high schoolers equally as driven,” Bell said in discussing the report’s findings. “If we give them the skills, they will become the future leaders we need right now.”
ECONOMIC DEVELOPMENT DEALS RISK RUINING CHICAGO

The single most powerful factor in a local economy’s health is whether people want to live there. If there’s an attractive quality of life, economies naturally grow. Subsidy and incentive deals rarely make a difference in these decisions.

By John C. Mozena

Illinois is quickly becoming a case study in how not to do economic development. State and local politicians have painted themselves into a corner where they are driving away the people and small businesses who should form the economy’s foundation with crushing tax and regulatory burdens, then making unsustainable deals to exempt a few favored companies and developers from those costs.

A toxic combination of broad fiscal mismanagement and economic development policy that’s stuck in the “smokestack chasing” model of the 1900s is putting Illinois’ future at risk. Unless something is done to refocus state and local economic development policy on people, rather than handing out billions of dollars to big corporations, Chicago and other Illinois cities risk falling down the same spiral that hollowed out the rest of the Rust Belt.

And yes, it can happen here. Consider Detroit: In 1940, it was the fourth-largest city in the United States. Decades of mismanagement, conflict and economic obstinacy drove residents away and hollowed out the city’s neighborhoods and business community. Today, it’s recovering from bankruptcy and isn’t even among the 20 most populous cities in the country. Or look at Cleveland, which went from the nation’s sixth-largest city in 1940 to the 51st today. There’s no guarantee that Chicago – or any other city in Illinois – couldn’t suffer a similar fate.

This spiral happens when people no longer want to live someplace, and with the people gone there’s no longer any reason for companies to do business there. Unfortunately, that’s the direction in which Chicago is currently headed. State and city politicians seem determined to find the limit of exactly how much burden the residents of the City of Broad Shoulders are willing to bear, while simultaneously exempting favored companies and developers from bearing those same burdens through subsidies, incentives, tax increment financing districts and other “economic development” mechanisms.

For example, Chicago recently announced a deal for Macy’s to exempt
the retail giant from paying almost $3 million a year in property taxes at its State Street store. In a world full of bad economic development ideas, tax incentives for retailers are among the worst. Retailers are going to go to where their customers are, and all the tax incentives in the world aren’t going to make them put a store someplace where those customers aren’t. Let’s be honest, Macy’s wasn’t going to move its flagship store to Gary or Kankakee if Chicago didn’t cut it a deal on its property taxes.

But that’s $3 million a year that Chicago either now won’t have to spend on things like police, fire and EMS services; or on roads or sewers or transit or streetlights. Either the city will spend less on these fundamental public services that underpin the quality of life a city offers its residents, or it will have to increase the burden on the broad shoulders of its other taxpayers even more to compensate.

At some point, the cost of living someplace outweighs the benefits, and people leave. When people leave, the jobs follow. And when that happens, ask the people of Detroit or Cleveland what value a city’s proud history has compared to the reality of its present mismanagement.

There is a consensus among researchers from across the political spectrum who study the economies of states and cities that the single most powerful factor in a local economy’s health is whether people want to live there. If there’s an attractive quality of life, economies naturally grow from a combination of locally-based startups and larger companies attracted by a local workforce. Conversely, if people don’t want to live in a community, they rarely start businesses there and companies move jobs away to someplace more attractive to the workers they need.

Subsidy and incentive deals rarely make a difference in these decisions as other business factors (such as where Macy’s customers are shopping) are usually more important. In the words of professors at the University of Connecticut and University of North Carolina who recently dug into the real-world results of economic development deals, “This simple but direct finding—that incentives do not create jobs—should prove critical to policymakers.”

Those policymakers, however, are too focused on taking credit in press releases for cutting those deals in the present to recognize the degree to which they’re mortgaging the future when those bills come due and nobody’s left to pay them.

It will be a great American tragedy if Chicago becomes the next once-proud city to learn that lesson the hard way. •
Combat exposure puts U.S. troops and veterans at substantial risk for abusing prescription opioids and even heroin — more so than service members who deployed but never saw a firefight, according to a working paper published last month by the National Bureau of Economic Research.

In the study, entitled “Did the War on Terror Ignite an Opioid Epidemic?” economists with NBER, a non-profit that conducts economic research and disseminates it to policy makers, corporations and academia, determined that opioid abuse among combat-exposed veterans was 7 percentage points higher than among those who deployed but didn’t see combat.

Regarding heroin use, the authors noted that combat exposure also is associated with higher use rates, finding that combat-exposed personnel took heroin at more than 1 percentage point higher than fellow service members who never directly engaged with the enemy.

The results are the first to “estimate the causal impact of combat deployments in the Global War on Terrorism on opioid abuse,” the authors wrote.

Resul Cesur, associate professor of healthcare economics at the University of Connecticut, said he and his colleagues undertook the study to understand the impact of the United States’ post 9/11 war footing and its relationship to the veteran opioid epidemic.

They were motivated by a study they did in 2010 that examined the relationship between combat and the development of post-traumatic stress disorder and revealed that service members who had PTSD also reported taking opioids.

“We have an opioid epidemic in the military population. That is well known. And nearly three million deployed since 9/11, so what is the impact of this combat?” Cesur asked. “We wanted to know if it was driven by combat or by some other selection factor. For example, are people who are prone to opioid abuse drawn to enlist? ... Our evidence shows strong evidence that the reason why so many military people are using opiates is because they are exposed to combat.”

The authors said the differences appeared to be driven in part by the number of personnel wounded in combat and prescribed opioids.
About a third of opioid abuse among service members and veterans could be explained by a war injury, noted Cesur and his associates, Joseph Sabia, professor of economics at San Diego State University, and W. David Bradford, in the Department of Public Administration and Policy at the University of Georgia.

With heroin, nearly 58 percent of all abuse could be linked to a war injury, they found.

The heroin use research also found that while abuse of the illicit drug is rare in the U.S. military, Army and Marine Corps had the highest rates of use, the Navy came in third and Air Force had the lowest rate of heroin use.

Nearly 2.8 million U.S. service members deployed 5.4 million times to Iraq and Afghanistan.

While its unknown exactly how many U.S. troops and veterans misuse opioids or use heroin, in 2015, VA officials reported they had seen a 55 percent increase in opioid use disorders among veterans following combat operations in Iraq and Afghanistan, and in fiscal 2016, VA treated roughly 68,000 veterans for opioid addiction.

Between 2010 and 2016, 6,485 veterans in the VA health care system died of opioid-related causes.

Hardest hit has been the enlisted population, who tend to make up the bulk of those deploying, and who, according to previous research, tend to be more susceptible to combat related mental health conditions and substance use, the NBER study noted.

The study estimated that the economic impact of opioid addiction among service members is roughly $1 billion a year, and for heroin use, $470 million.

The authors cautioned, however, that the cost likely is higher as U.S. troops and veterans tend to under-report problems with addiction or live in areas without access to therapy and medical treatment.

“These are likely to be the lower estimates of the economic impact of combat on treatment-related expenses,” Cesur said.

Both the Departments of Defense and Veterans Affairs have launched campaigns to curb opioid prescriptions and are conducting research to understand the scope of the problem within the military and veterans populations.

In 2010, DoD and VA issued new clinical practice guidelines aimed at reducing opioid prescriptions for pain other than end of live palliative care, and in 2013, VA launched an Opioid Safety Initiative aimed at encouraging pain management approaches that didn’t include opioids.

Opioid prescriptions have dropped by 40 percent at VA since 2012, the result of prescribing habits and greater reluctance of physicians to prescribe them.

This year, Air Force Capt. Carl Beyer discussed his work at the University of California Davis and David Grant U.S. Air Force Medical Center at Travis Air Force Base exploring the risk of opioid abuse among combat casualties at the Military Health System Research Symposium in Kissimmee, Florida.

According to Beyer, nearly 40 percent of all service members injured in combat were prescribed opioids at hospital discharge and a quarter continued to take them for a prolonged period of time following their discharges. Of those, nearly 7 percent developed opioid abuse.

The research may help develop strategies for prescribing pain medications to
injured personnel and advance studies on alternatives or holistic therapies for managing pain, DoD officials said.

“The DoD and VA are really the only place in the United States where we have the long-term care of trauma patients under one health care system so we can do that long-term research. It’s really exciting,” Beyer told reporters at a press conference during the meeting.

The NBER study concluded that combat exposure not only increases consumption of prescription narcotics and heroin, it also increases sedative and tranquilizer use for non-medical purposes and using opioids together with drugs like benzodiazepines, which also depress the central nervous system and increase the risk of overdose.

The authors added, however, that in states with medical marijuana is available, pain medication prescriptions, opioid-related hospitalization stays and age-adjusted opioid death rates have dropped.

“While marijuana legalization is certainly not a silver bullet, evidence that marijuana and opioids are substitutes suggests that access to medical marijuana may provide an alternative, less addictive, and less unhealthy means of treating pain,” they wrote.

“Opioids are deadly,” Cesur said. “There’s convincing evidence that use of medical

marijuana may be an alternative.”

To draw their conclusions on the relationship between opioid use and combat exposure, the study authors used information from two major studies - the National Longitudinal Study of Adolescent and Adult Health and the 2008 Department of Defense Health and Related Behaviors Survey.

From the first study, they derived data from 482 male service members, nearly 13 percent of whom said they used prescription drugs for recreational or non-medical purposes. Using the second study, of 11,542 service men who reported being in combat, 9 percent said they used pain relievers for non-medical use and .6 percent reported using heroin.

Cesur said they used the data from the 2008 DoD study because its time frame correlated with results of the other survey and also, the DoD survey was conducted during a time frame when a large number of respondents had been deployed, either to combat or elsewhere. ●
PROMOTIONAL GAMES AT RETAIL STORES INCREASE CONSUMER SPENDING

Games of chance are potential goldmines for both brick-and-mortar stores and online retailers

University of Connecticut

Shoppers who win retail discounts through scratch-off tickets or other games of chance are more likely to make a purchase, and spend more money, than customers offered standard discounts that apply to everyone, according to a new study led by the University of Connecticut.

Games of chance are potential goldmines for both brick-and-mortar stores and online retailers, said Stefan J. Hock, UConn assistant professor of marketing and the lead author of the study in the Journal of Consumer Research.

“Winning a discount affects perceptions of luck, which leads to positive store attitude, which, in turn, increases shoppers’ likelihood of making a purchase and their overall spending,” said Hock.

Surprisingly, even when the discount won from a promotional game is smaller than a traditional discount -- say only 10% versus 20% -- researchers still saw the same phenomenon.

Hock, together with professors Rajesh Bagchi of Virginia Tech University and Thomas M. Anderson of the University of Colorado, compared won discounts with straight discounts in terms of conversion rates (the likelihood of making a purchase) and overall spending, across seven studies in 2017 and 2018.

The largest study looked at the behavior of 1,073 customers of a mid-sized, U.S.-based e-commerce company that specializes in interactive video tutorial. All others examined the behavior of college students and ranged in size from about 200 to 500.

The researchers found that discounts obtained from promotional games always generated greater likelihood of purchase and overall spending, ranging from a 42% to 213% increase.

Of note, shoppers who believe in luck got a confidence boost from doing well in a game of chance and this ‘lucky day’ phenomenon seemed to give them greater buying confidence. That was particularly true when the shopper was looking for a self-indulgent item, versus a necessity.
The pleasure derived from scoring a discount at a retailer seems to have a lingering impact, with the shopper developing a good association with the retailer. In one study, Hock and his colleagues found shoppers said they would be willing to go farther to buy an identical item (in this case a candle) from the store that had offered the promotion, rather than selecting a closer competitor.

**Retailers Should Use Games Strategically**

In the U.S., discounts and promotions account for more than 25% of total sales of consumer goods.

But some large companies, including Forever 21 and J. Crew, frequently employ games of chance, with customers taking part in a game with uncertain outcome. In fact, it was a scratch card presented to Hock at a prominent clothing store that triggered his interest in the study.

The increase in sales was driven by more consumers buying rather than a smaller group of consumers each buying more. Because games of chance increase the likelihood that customers will buy, stores benefit from a larger customer base, which grows the retailers’ long-term profitability.

“What we’ve learned is that this type of promotion can be cost effective for the merchant if the ‘chance’ discount is the same or even less as what a retailer would offer for a straight discount,” Hock said.

Managers can use these games strategically as a cost-efficient way to enhance store loyalty and build brand equity. However, Hock cautioned, the tactic can be overused.

“My word of caution, though, is that it should be used sporadically. If I ‘win’ a discount every time I shop, there’s no perception of luck or chance,” Hock said. “Since many brick-and-mortar stores are struggling, this may be a small piece of the puzzle that helps them generate higher sales.”
Neag School of Education
HOW CHILDREN EVOLVED TO WHINE
And how to stop them from driving you bonkers.

By Jessica Grose        Illustration by Francesco Ciccolella

Little kids are diabolically engineered to make their parents do what they want. That’s the overwhelming impression I got when I talked to a bunch of academics about the origins of whining. “Children are good at co-opting whatever arsenal of behaviors they have” to get parental attention, said James A. Green, Ph.D., a University of Connecticut psychology professor who studies early social development.

The scholars I spoke to agreed that whining was both an under-researched area in developmental psychology, and such common kid behavior that it was likely a cultural universal. Even certain types of monkeys whine, said Rose Sokol-Chang, Ph.D., who studied whining at Clark University, and now works at the American Psychological Association.

Monkey and human children alike use “whining to bridge a gap with an adult,” said Dr. Sokol-Chang — which is to say, they’re whining to get your attention, and fast. Babies may develop a whiny type of cry as early as 10 months, but full-blown whining doesn’t pick up until they learn to speak, Dr. Sokol-Chang.
said. Though whining typically peaks in toddlerhood and decreases with age, “I’m not sure it really goes away,” she said, pointing out that adults even whine to their partners.

What distinguishes whining from other types of vocalization is how deeply annoying it is — which is why it’s such a successful tactic for getting a parent’s attention. Dr. Sokol-Chang led an experiment where she asked 26 parents and 33 nonparents to complete simple math problems while listening to various human sounds (infants crying, neutral speech and “motherese,” in addition to whining). Whether or not they were parents, participants forced to listen to whining made more mistakes and completed fewer problems; whining proved even more distracting than the sound of infants crying.

Though whining is awful for everyone within earshot, kids (to say nothing of aggrieved spouses and, apparently, monkeys) reserve whining for people they are emotionally attached to; this isn't behavior they’ll try with strangers, Dr. Sokol-Chang said.

Even baby monkeys understand that an annoying noise gets them a faster response — especially in public. One study of rhesus macaques showed that mothers attended to their crying infants faster when there were unrelated monkeys around; the researchers surmised that the rhesus mothers were concerned that their babies’ cries, which are “high-pitched, grating and nasty to listen to,” per the BBC, might provoke the other monkeys. As Dr. Sokol-Chang put it, even monkey parents think, “don’t embarrass me in front of my friends.”

So how do you get your whiny kid to cut it out already?

Ignore the behavior.

Dr. Dunya Poltorak, a pediatric medical psychologist in private practice in Birmingham, Mich., said the first thing to know is that disciplining children for whining can backfire. “Scolding or disciplining can inadvertently reinforce the behavior. They’re looking for a response; when they don’t get a positive response, they’ll go for the negative one,” Dr. Poltorak said. Children look to you to model behavior, so if you’re yelling, “I can’t stand it when you do that, you drive me crazy!” you’re basically teaching them to give that right back to you.

Dr. Poltorak recommended finding a calm moment and sitting down with your child, saying something like: “I love listening to you and I love helping you. Let’s practice using our nicest words to ask for help, because if you whine or cry or scream, I won’t be able to help you.” Then you need to follow through and ignore your kid when she asks for something in a whiny voice. Children’s whiny behavior may escalate when you begin ignoring it, Dr. Poltorak cautioned, so be prepared to stay the course; in time, they’ll realize whining doesn’t get them the attention they desire. When your child asks for things nicely, make sure to reinforce that good behavior with praise, Dr. Poltorak said.

Catch the whine before it starts.

Another tactic, which Dr. Sokol-Chang recommended, is to try to observe your child’s particular behavioral signs that tend to lead up to a whine, so that you can give her positive attention before it even starts. But this isn’t always possible, especially if your child starts whining every time you attempt to have a conversation with another adult.
Beat them at their own game.
Nicholas S. Thompson, an emeritus professor of psychology and biology at Clark University who worked with Dr. Sokol-Chang on her whining studies, offered this last strategy, speaking more as an experienced grandpa than as an academic psychologist. Dr. Thompson whines right back at his grandchildren, telling them: “I’m the expert on whining, and you’re not even doing it right. Let me teach you how to whine properly.” The second his grandchildren saw he was in on their game of manipulation, they got a funny look on their faces, and stopped.
to graduate from high school and 4 percentage points (13 percent) more likely to enroll in college than their peers in the same school who are not assigned a black teacher.”

The researchers describe their findings as “arguably causal” and say that they are “robust” in a series of comparisons they made. (The Tennessee program has very few Latino participants, so the researchers were unable to measure whether the impact was the same there, although they write that this is an important research question to study.)

Given the way many colleges struggle to recruit black students, the findings could point to a different approach to, over the long term, increasing black college enrollment, by trying to educate more black students to be teachers. At the same time, the authors note that the challenge for American educators isn’t just recruiting more black people into education, but thinking about all of the consequences of such a move.

“Findings from this research provide some reason to be optimistic as they provide a path to reducing stubbornly persistent racial attainment gaps,” the authors write. “However, they also raise a number of questions, some of which could be addressed in future research, surrounding efforts to diversify the teaching workforce. For example, while our study provides strong support for the idea that diversifying the teaching workforce could ceteris paribus have a strong and positive effect on historically disadvantaged students, a pipeline that could achieve massive growth in the number of black teachers is nonexistent. Hiring practices that attempt to diversify while maintaining high teacher quality would thus necessitate, for example, re-allocating college educated blacks from other lucrative fields to teaching, a relatively low-paid occupation. Doing so might lead to unintended consequences, such as exacerbating existing racial wage gaps, at least in the short run. To put this issue into perspective, consider the following back-of-the-envelope calculation. Of the roughly 3.8 million K-12 teachers in the U.S., approximately 256,000, or 6.7 percent, are black. Comparing this fraction to the 15.4 percent of K-12 students who are black suggests that doubling the number of black teachers would begin to get us close to aligning the work force with the student body they are supposed to teach.”

The researchers add, “Doing so would necessitate steering 256,000 additional black college graduates from other occupations into teaching. Using the 2018 March Current Population Survey (CPS), and focusing on females with a bachelor’s or master’s degree, the group that comprises most teachers, we find that median earnings for blacks who are not teachers is roughly $49,000 while median earnings for blacks who are teachers is $45,000. Supposing non-teachers who became teachers were previously earning the median non-teacher income and now earn the median teacher income, efforts to diversify the teaching workforce imply a $4,000 pay cut for 256,000 black workers, thus reducing total income for blacks by more than one billion dollars.”

The authors of the study are Seth Gershenson of American University; Cassandra M. D. Hart of the University of California, Davis; *Joshua Hyman of the University of Connecticut*; Constance Lindsay of the Urban Institute; and Nicholas W. Papageorge of Johns Hopkins University. ●
GIFTED CLASSES MAY NOT HELP TALENTED STUDENTS MOVE AHEAD FASTER

Survey finds emphasis on developing “creativity” and “critical thinking” instead of acceleration above grade level

By Jill Barshay

One of the big justifications for gifted-and-talented education is that high achieving kids need more advanced material so that they’re not bored and actually learn something during the school day. Their academic needs cannot be met in a general education class, advocates say. But a large survey of 2,000 elementary schools in three states found that not much advanced content is actually being taught to gifted students. In other words, smart third graders, those who tend to be a couple grade levels ahead, are largely studying the same third-grade topics that their supposedly “non-gifted” classmates are learning.

The survey found that instead of moving bright kids ahead to more advanced topics, gifted classrooms are preoccupied with activities to develop critical thinking and creativity, such as holding debates and brainstorming. The third most common focus in gifted curriculums is to give students more projects and games, so-called “extension activities” that are tangentially related to their grade-level content. Accelerated math instruction ranked 18th on a list of 26 items that gifted curriculums could focus on. Advanced reading and writing instruction ranked 19th. Teaching academic self-confidence, leadership skills and social emotional learning all ranked higher than teaching above grade level content.

“Teachers and educators are not super supportive of acceleration,” said Betsy McCoach, one of the researchers and a professor at the University of Connecticut. “But it doesn’t make sense to pull kids together to do the same thing that everyone else is doing.”

The survey, conducted by six researchers at the National Center for Research on Gifted Education at the University of Connecticut, was presented on April 5, 2019 in Toronto at the annual meeting of the American Educational Research Association. The researchers did not disclose the names of the three states they studied but said they were located in the South and Midwest. In all three states, schools are required to identify high achieving students and offer them gifted programs. (Many states in the Northeast don’t have a mandate to offer gifted education.)

More than half the gifted students in the three states were white. In one of
the three states, almost three-quarters of the gifted students were white even though they made up roughly half the population. In that same state, blacks made up a quarter of the population but had fewer than 10% of the gifted seats. Hispanics had 7% of the gifted seats and made up 16% of the population.

It’s important to point out that the researchers only surveyed schools and district administrators; they didn’t actually analyze the content or quality of gifted curriculum. Still, it’s revealing that three-quarters of the schools admit that they don’t use a separate curriculum especially designed for gifted students in reading or math. Without a curriculum, teachers are making their own decisions about what to teach. One classroom in one school might be offering a very different education than another gifted classroom down the hall.

Researchers found a wide variation in how schools teach gifted students. Within each state, roughly half the schools put gifted students together in separate classrooms. Other schools pull students out of their regular classrooms for a few hours a week of gifted instruction. Other times, a teacher is sent into classrooms to work with gifted students. A fourth common approach is to create small groups within a class, clustering gifted kids together for many assignments. Most schools used a combination of the four approaches, but researchers didn’t find one approach worked better than the others. Achievement gains were similar regardless.

The researchers say their survey is evidence of a “disconnect” between who gets labeled “gifted” and how these students are actually getting taught in American classrooms. They point out that the kids are being selected for these programs because they have high math and reading scores yet they’re not given much advanced instruction in either subject.

Sluggish learning for the brightest Americans may be the consequence. The researchers also tracked the annual state test scores for more than 350,000 students in these three states who started third grade in 2011. Gifted students, on average, began third grade with academic achievement two grade levels above the academic level of non-gifted students but posted slower academic growth than general education students between third and fifth grades. Other studies have also found slower growth for advanced students during the school year.

However, it doesn’t seem that gifted education is entirely useless. High achieving kids who weren’t identified for gifted services but still scored above the median score for gifted students on the third grade test had even slower academic growth than students in the gifted programs. So perhaps these critical thinking and creativity exercises are doing something.

This research points to the lack of consensus on what the goals of gifted education should be. Many don’t think it should be about advancing students as quickly as possible. High quality instruction that helps kids who’ve already mastered the basics go deeper into the material may ultimately be beneficial. And annual state assessments may not do a good job of measuring this kind of depth, creativity or critical thinking.

McCoach argues that research supports acceleration, citing a 2004 summary of the research evidence conducted by scholars at the Belin-Blank Center at the University of Iowa. She also points to rigorous studies that found learning gains for gifted students who learned from different curriculums that combine
acceleration with enrichment, such as those developed at William & Mary College and the University of Virginia. “This is one area where there is the most solid research base,” said McCoach. “If kids are given more accelerated instruction, we see higher growth.”

Why do schools tend to ignore this research evidence? McCoach speculates that many educators are worried that students who race ahead will face social problems at school, even though, she says, there is no research to support this widely held belief.

State testing itself might also discourage school leaders from changing the curriculum for gifted children. Gifted kids tend to score at the top, propping up school ratings and rankings; there’s a fear that even bright kids might do worse on grade-level material emphasized on the test if they are spending most of their time on future topics. “Gifted students are the ringers for the state tests,” said McCoach. School leaders “don’t want to be shooting themselves in the foot,” she added.

I hope this study calms anxious parents who worry that their kids will miss out on a great education if they don’t get into a gifted program. And for education policy officials, it’s worth revisiting what the point of gifted education is, especially when the students are disproportionately white. In the future, McCoach and her colleagues plan to study how gifted programs increase racial segregation. In the meantime, the debate over gifted education continues.

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RESEARCH SHOWS THAT CHARTERS DO BEST FOR CALIFORNIA’S LOW-INCOME AND MINORITY STUDENTS.

Now Lawmakers There Want to Slow Their Expansion

By The 74

California’s years-long debate over school choice has taken a decisive turn over the first few months of Gov. Gavin Newsom’s tenure — and the shift has come at the expense of charter schools.

In February, Newsom convened a panel of experts to investigate whether...
charters siphon funding from school districts. The next month, he signed a law — repeatedly vetoed by the previous governor — establishing greater transparency requirements for the schools and their leaders. All the while, attention-grabbing teacher strikes in Los Angeles and Oakland put the issue of charter growth at the top of the state’s education agenda, alongside teacher pay and school funding.

Now a series of bills is moving through the legislature that could dramatically curtail the charter sector’s growth. The most contentious of the package, Assembly Bill 1505, which would grant local districts greater leeway to reject petitions for new charter schools, has passed the state Assembly and now faces consideration in the state Senate. Others, including a measure to cap the total number of charters in the state, have lost momentum over the past week.

Charter School Showdown in California: Assembly Moves Forward with Package of Powerful Regulations as Proponents and Teachers Unions Clash

Taken together, education observers have seen the past five months as signs that California’s long period of virtually unchecked charter expansion may be ending. Foes of the privately operated public schools, most notably the state’s teachers unions, would relish the possibility. But for the students who gain the most from charters, a slowdown or reversal of the sector’s recent growth might not be cause for celebration. Those students, studies show, are disproportionately black, Latino and low-income children from the state’s biggest cities; ironically, they’re also represented by some of the sector’s most prominent critics — including Newsom himself, formerly the mayor of San Francisco.

The lay of the land

To understand how controversial charters are in California, you have to get a sense of just how prominent a feature they are in the state’s education landscape.

According to state data, more than 650,000 kids attend charter schools in California, or roughly 10.5 percent of all pupils in the state. Those numbers are huge in both absolute and relative terms: It is, by far, the largest statewide charter enrollment in the country, larger than the total populations of Wyoming or Vermont; it’s also proportionately larger than the average statewide charter enrollment across the U.S., which is about 6 percent.

The sector has also reached that impressive scope rather quickly, gaining more than 100,000 new students in just the past five years. That head-snapping pace of expansion came even as California’s total K-12 enrollment saw persistent declines.

In other words: A shrinking pool of enrollees, and the state funding that goes along with them, has put downward pressure on school district budgets at the same time that charters emerged as new competition. In an added wrinkle, California law actually prevents school districts (which authorize the vast majority of charter schools in the state) from rejecting new charter petitions on the basis that they pose a threat to local finances (AB 1505 would revoke that prohibition).

The growing clash for kids and dollars explains why the political battle around the sector has gotten so hot — and expensive.
The past few election cycles have seen record spending from both teachers unions, which adamantly oppose further charter expansion, and the deep-pocketed philanthropists who tend to support it. The money wars erupted again in the 2018 Democratic gubernatorial primary, which pitted charter-friendly former Los Angeles mayor Antonio Villaraigosa against then-Lt. Gov. Gavin Newsom, who won the endorsement of the California Teachers Association. Newsom ultimately raised an unheard-of $58 million on his way to earning his party’s nomination, including $1.2 million in donations from the CTA; once that race was decided, the education-related spending migrated to the race for state superintendent — a largely ceremonial job with little statutory power over charter schools.

California’s Campaign for State Superintendent Costs More Than Most Senate Races. Here’s Why

In that election as well, the union-backed candidate, Tony Thurmond, prevailed over his more reform-oriented opponent. Thurmond, who said during the campaign that he wanted a “pause” on new charter openings, now chairs the commission looking into the impact of charter competition on traditional public schools. The group’s report is scheduled to be released in July.

So how good are they?

The increasing focus on charters’ financial effects inevitably leads to the question of their academic effects. But, much the same as with charter schools throughout the country, California’s sector has yielded mixed results.

“The charter sector in California looks like a microcosm of the charter sector nationally,” said Martin West, an education professor at Harvard. “That’s not too surprising, since California charter schools make up a nontrivial segment of the national charter data.”

Indeed, a comprehensive 2014 study from Stanford’s Center for Research on Education Outcomes (CREDO) found that students who attended California charters performed a bit better in reading, and a bit worse in math, than their peers attending traditional public schools. That nuanced picture dovetails with charter performance nationally, which is roughly as good, on average, as the public schools run by local school districts.

But tucked beneath the topline results, the data show that charters perform better for the state’s least advantaged citizens. Specifically, CREDO found that poor black students at charters gained an average of 36 extra days of learning in literacy, and 43 extra days of learning in math, compared with those in traditional public schools; poor Latino students gained 22 extra days of literacy and 29 extra days of math. In general, charter schools in urban areas, where many of those students are clustered, were measured as much stronger than those in suburban and rural areas.

Center for Research on Education Outcomes

Those findings were echoed in CREDO’s 2014 study of Los Angeles charters, released the same year, which found even stronger results for minority students than were measured statewide. In yet another paper, this one released the next year and directed at 41 different urban areas, the research group found that a majority of charter schools in the Bay Area (encompassing the large districts of Oakland, San Francisco and San Jose) outperformed traditional public schools in both reading and math.
In a 2018 research brief intended as an update on previous research, CREDO Director Macke Raymond cast the charter results for traditionally underperforming student groups as evidence that academic improvement can be achieved in every educational setting. In an interview with The 74, she did observe that enough time has passed since the original studies that “[she couldn’t] really tell whether the trends are holding fast or whether they’re changing.”

Still, the existing research base strongly suggests that the primary beneficiaries of charter schools in California are historically disadvantaged populations in big cities like Los Angeles and Oakland. But nowhere have the calls for curbing charter growth been louder than in those very cities, where striking teachers demanded official support for a statewide charter moratorium as a condition of returning to work.

**Preston Green, a professor of education at the University of Connecticut,** has warned that the lack of tighter regulations has complicated the financial state of small districts, potentially leading to a bifurcated school system resembling that of the Jim Crow South. While he told The 74 that he understands the appeal of charters as an option for black and Latino families, he also said that he supported a temporary moratorium on new charters.

“**We really need to think systematically about how to permit charter schools to exist in a way that won’t deleteriously impact school districts,**” he said. “So understand that when I’m calling for a moratorium, I’m not calling for a backdoor closure but, rather, really thinking deliberately about how they can exist and be situated in a way that their inefficiencies are lessened.”

Harvard’s West, who examined California’s charter authorizing practices in a paper last year, found that local districts often struggle to act as truly capable authorizers for charter schools — a deficiency made worse by the meager funding provided by the state to act in that role. But although greater resources and oversight might improve the sector’s performance, he told The 74 that such proposals have been absent from the debate raging in Sacramento.

“That’s a different set of issues ... animating the debate in California at the moment. It seems to me that in California, you’re seeing a much more concerted attempt to prevent charter expansion, at least in districts that don’t welcome it, by empowering districts to deny new charter petitions. More than anything else, that’s what’s going on here.”

CREDO’s Raymond, while lamenting that the data on California’s charter sector aren’t more current, indicated that she didn’t support the slate of new regulations.

“I’ve spent 25 years studying what happens when monopolies face competition — and I’m on the record here — I’ve never seen any other industry that allows the monopolist to determine the fate of the new entrant.”
POSITIVE PARENTING: SPATIAL SKILLS BECOME MATH SKILLS

We didn’t believe it either.

By Jessica Sanchez

Playtime is lots of fun for your young child, but it could also be an opportunity to improve their math skills.

Spatial skills, or the ability to describe where objects are in relationship to other things, have long been proven to enhance a child’s math abilities. But how exactly do these early math skills translate to higher math achievement and learning?

Researchers at Boston College and the University of Connecticut tested 138 first-grade girls on arithmetic, verbal and spatial skills. Then in fifth grade, they tested them on math reasoning.

Researchers found that children who had strong spatial skills in first grade were more likely to perform better on the assessment of math reasoning in fifth grade.

Furthermore, they found that a specific arithmetic strategy led to higher math reasoning skills four years later. It’s called decomposition, breaking down a harder problem into easier math facts.

The research suggests play that involves the child holding and rotating spatial images in their head is one of the best ways to develop spatial skills. So parents, encourage your child to play with blocks or puzzles which emphasize how pieces can rotate and fit together.

About three-quarters of the girls in the study had mothers with a college or graduate degree.

This article was published on June 18, 2019.
RESEARCH: FLIPPED LEARNING BOOSTS TEST SCORES

By Dian Schaffhauser

The latest word on the use of “pre-class activities” — flipped learning — is that it improves student engagement in the class itself as well as students’ assessment scores. A recent study by a team of researchers from Macmillan Learning and the University of Connecticut examined the use of flipped learning through Achieve, a new Macmillan digital learning tool, and found a “significant effect” with its use.

Achieve is a set of course tools designed with learning science in mind that allows the instructor to give personalized recommendations to students for “optimal learning paths.” The pre-class activities are one of the resources included in the product that faculty can choose to implement with their classes.

The study involved 40 instructors at 38 institutions in multiple disciplines who all used Achieve in their classrooms but who could choose to use the pre-class activities or not. All were given a half-hour of training on the use of the program. A total of 2,251 students agreed to participate in the study and, based on which course they took, “naturally” fell into the test group (“pre-class users”) or the control group (“non-pre-class users”). In total, 1,372 students participated in the pre-class activities and 879 didn’t.

As documented in “The Flipped Effect,” a paper presented at the American Evaluation Association Evaluation conference last week, the researchers wanted to answer two big questions (among several smaller ones):

- Whether the summative assessment scores improved for those students in the Achieve group; and
- What impact the use of Achieve might have had on final exam scores, no matter what the student’s previous academic performance, baseline level of motivation or who the instructor was.

The pre-class activities could typically include the use of five- to seven-minute videos describing the course content with quizzes or assigned reading with quizzes or both. The goals: to help students gain an understanding of vocabulary and core concepts and to support their longer-term learning “through retrieval practice,” as the researchers explained.

To generate the data used in the final analysis, the researchers ran student and instructor surveys at the beginning and end of the semester. Faculty also filled out weekly Achieve “implementation
logs”; and they were interviewed mid-semester. The researchers extracted data from Achieve itself on a weekly basis and at the end of the study, and instructors shared student records at the end of the semester.

The big question — whether testing improved for those students using the pre-course learning activities — came in affirmative. As the report stated, “assigning pre-class activities ... significantly supports better performance on summative assessments within Achieve.” And, likewise, “assigning pre-class activities in Achieve supports better performance on final exams in their course.” In fact, the researchers suggested, “the average difference in assessment scores would represent more than half of a grade in most higher educational institutions.” •
The Department of Kinesiology
Adults who practice yoga with breathing and relaxation exercises at least three times a week may have lower blood pressure than people who don’t, a research review suggests.

For the study, researchers analyzed data from 49 trials with a total of 3,517 participants who were typically middle-aged, overweight women and men who already had high blood pressure or were close to developing the condition. These smaller trials assessed blood pressure before and after participants were randomly assigned either to doing yoga or to a control group without exercise programs.

Overall, the people in the yoga groups experienced average reductions in systolic blood pressure of 5 mmHG (millimeters of mercury) more than those in the control groups, and diastolic blood pressure was reduced by 3.9 mmHG more with yoga.

When people with high blood pressure did yoga three times a week in sessions that also included breathing and relaxation exercises, they experienced average decreases of 11 mmHG more in systolic blood pressure and 6 mmHG more in diastolic blood pressure.

“Our results not only showed that yoga can be just as, or even more effective than aerobic exercise to reduce blood pressure; but also quantitatively showed the importance of emphasizing yoga breathing techniques and mental relaxation/meditation along with physical forms during practice,” said lead study author Yin Wu, a researcher in kinesiology at the University of Connecticut in Storrs.

“So, yoga, among other lifestyle interventions (such as diet and smoking cessation) should be adopted early on even when the blood pressure is still relatively low, and should be continued along with medication when blood pressure is relatively high,” Wu said by email.

Yoga appeared beneficial, but less so, when people practiced regularly but didn’t focus on breathing and relaxation or meditation. Under these circumstances, yoga was associated with average drops of 6 mmHG more in systolic blood pressure and 3 mmHG more in diastolic blood pressure compared to the groups doing no exercise.

In adults, a normal or healthy blood pressure reading is considered to be 120/80 mmHG or lower.
School of Law
WEIGHT DISCRIMINATION IS RAMPANT. YET IN MOST PLACES IT’S STILL LEGAL.

Massachusetts may become the second state to add ‘weight’ to its list of protected categories

By Rebecca Puhl

The Borgata Hotel Casino & Spa in Atlantic City obsessively monitored the weight of its waitresses, according to 22 of them who sued it in 2008. They would be suspended, for example, if they gained 7 percent more weight than they had when they were hired. But a New Jersey judge threw out the suit, explaining that state law was silent about weight discrimination. The state Supreme Court affirmed the decision three years ago.

A hospital in Victoria, Tex., made headlines in 2012 after it imposed a strict body mass index (BMI) limit on employees — 35, in the obese range, was the cutoff — citing patients’ expectations of what a health-care provider should look like. It was entirely legal.

The American legal system offers strikingly limited recourse for people who have been treated unfairly because of their size. Right now, cases like this stand a chance mainly in Michigan, where a civil rights law has prohibited weight discrimination for more than 40 years. (A handful of cities have similar ordinances, though the District’s ban on discrimination based on “appearance” offers less clear-cut protection; meanwhile, courts wrestle with the degree to which the Americans With Disabilities Act covers people who have been treated unfairly because of obesity.) But now Massachusetts lawmakers have introduced a bill that would make it illegal to discriminate on the basis of weight in that state. It’s very concise, simply adding “weight” (and “height”) to the list of protected categories in existing anti-discrimination law, alongside race, age, sexuality and disability.

Academic research shows that weight-based stigma, prejudice and outright discrimination are rampant. One review of studies found that 19 percent of adults with “Class I” obesity (a BMI of 30 to 35) reported experiencing treatment they viewed as unfair, in various settings. The figure rose to 42 percent for people who were more obese. At each level of obesity, women reported more discrimination than men.

The rise in U.S. obesity rates — by now, almost 40 percent of Americans meet the definition — has not reduced such stigma. A study published this year by two Harvard psychologists found that overtly negative attitudes toward people...
based on body weight had declined by only 15 percent from 2004 to 2016; in contrast, explicit racism dropped by 37 percent and explicit anti-gay feelings by nearly half. Even more strikingly, when the researchers examined “implicit” bias — unconsciously held attitudes, revealed through careful laboratory testing — weight bias (unlike every other type) appeared to be getting slightly worse over time.

It shouldn’t be surprising that these biases often translate into mistreatment of people. One review of existing research found statistically significant penalties for people who are overweight or obese at every step of the employment process: hiring, evaluations, promotion and firing. Estimates of a wage penalty vary, but most studies are consistent that one exists. In medical settings, reports by overweight people of biased treatment are legion. (You wouldn’t have to be overweight, by BMI standards, to be protected by the proposed Massachusetts law; it would cover a case like that of the Borgata waitresses, who were punished for minor weight gain.)

Contrary to popular assumptions, calling negative attention to people’s weight does not motivate them to adopt exercise regimens or otherwise improve their health. In fact, research suggests the opposite: Weight stigma worsens quality of life for people on its receiving end, even increasing mortality rates — probably because of such factors as increased stress and depression.

There’s strong backing for laws banning weight discrimination, as studies by my team at the University of Connecticut have shown. From 2010 to 2015, support for such provisions increased from 73 percent to 79 percent, in a representative sample of adults nationally. Notably, our most recent research found no differences in public support by political orientation.

The testimony of people in favor of the Massachusetts bill — proposed, in various forms, several times in recent years — has been deeply moving. I vividly recall one woman, a public relations professional, who explained how her supervisor made her undergo humiliating weekly weigh-ins in his office to keep her job.

Many physicians, public health professionals and legal scholars have joined the chorus supporting the Massachusetts bill. So why are lawmakers there and elsewhere hesitant to act?

Skeptics of such laws offer several arguments. They suggest that, unlike race or age or gender, weight is largely under the control of the individual — ignoring genetic and environmental factors, prominent contributors to obesity. They say anti-weight-discrimination laws could make it illegal for a company to encourage weight loss among employees in an effort to reduce insurance costs. However, it is easy to design a nondiscriminatory wellness program that promotes healthy behaviors for all workers, rather than penalizing one group. Mostly, skeptics raise the specter of an explosion of unjustified lawsuits.

But that hasn’t happened in Michigan: In 2018, according to the state’s Department of Civil Rights, out of some 2,100 discrimination complaints received by the state, only 39 concerned weight. And Michigan’s approach seems to be working. A survey of more than 1,000 state residents in 2013 found lower rates of self-reported weight-based employment discrimination, particularly for women, the main targets of
mistreatment, relative to rates identified in other states.

In Massachusetts, the amusement park industry objected that the proposed law would make it hard for parks to comply with safety standards — namely, weight and height limits for certain rides. The latest version of the bill allows exemptions for federal, state and industry safety standards. And Michigan allows companies to appeal for exemptions from the law, in rare cases.

Weight discrimination is a legitimate and prevalent societal problem. It inflicts pain and suffering, causes financial harm, and impairs quality of life — and it should be banned, just like other forms of invidious discrimination.

Rebecca Puhl is a professor in the department of human development and family sciences at the University of Connecticut. She is also deputy director of the university’s Rudd Center for food policy and obesity.

Phys.org

GOVERNMENT-FUNDED RESEARCH INCREASINGLY FUELS INNOVATION

By University of Connecticut

For the third year in a row, the Trump administration has proposed large cuts in science funding across a variety of agencies. Although Congress restored these cuts in the past two years, increased budgetary pressures may discourage them from doing so this year.

Now, new research from the University of California, Berkeley, the University of Connecticut, Boston University, and Harvard University shows that these cuts in federal funding for science might endanger the innovation that increasingly fuels the modern economy. The study was published recently in Science.

By computing new linkages between government grants and tens of millions of U.S. patents and scientific papers from 1926 to 2017, the multi-disciplinary research team demonstrated that almost a third of patents in the U.S. rely on federal research. Although this may be a
conservative estimate, this number has increased steadily over the past 90 years.

“Technological progress is seen as a process through which inventions build on one another. In this study we examine the importance of government-supported research as contributing to subsequent inventions,” says Hillary Greene, Zephaniah Swift Professor of Law at the UConn School of Law.

Greene, who is an expert in patent law, came to UConn Law in 2007 after having previously served as project director for intellectual property at the Federal Trade Commission’s Office of the General Counsel. In addition to having served as the inaugural director of UConn Law’s Intellectual Property and Entrepreneurship Law Clinic, she has continued to examine innovation issues from many angles, including writing and teaching extensively on the relationship between innovation and competition policy.

“The fact that Professor Greene is the first UConn Law professor to be featured in Science speaks to her truly impressive body of research,” observes Timothy Fisher, dean of the UConn School of Law. “It is one that both spans diverse legal regimes and engages with multiple disciplines to provide valuable insights on topics like the impact of government investment on innovation.”

The study, the first of its kind, offers a more holistic view of the impact of federal funding on innovation. Where previous studies established impacts within particular fields, the current work provides a historic and quantitative analysis of all U.S. patents—over a long period of time.

The research also establishes that corporations have steadily increased their reliance on federally supported research. The effect occurs across all fields; as the most extreme example, almost 60 percent of the patents in chemistry and metallurgy rely on federally supported research. Additionally, the team notes that patents that rely on federal research “are more important as measured by future citations, renewal rates, and novel terminology” than patents that do not rely on federal research.

According to Lee Fleming, lead author and professor of industrial engineering and operations research at UC Berkeley, this study is significant because it is the first to quantify the historical sweep of federal science patenting in the U.S. and provide data that illustrate how much the country’s patenting has relied on federal science funding since 1926.

Federal research funding is at the heart of the current study in more ways than one. In 2015, Greene and her collaborators were awarded a federal grant from the National Science Foundation in support of this research. The grant was titled “The Reach of the Visible Hand: Government Acknowledgments in U.S. Patents and Technological Change.” Fleming and Greene were co-principal investigators on the grant.

“This research is an effort to detect, in a more nuanced way, the myriad fingerprints that U.S. federal research leaves, directly and indirectly, on innovation by others,” says Greene. “We hope that it provides insights for the government, corporations, and citizens about where this funding goes and the downstream impact it has on innovation. And let’s not forget, that does not include the social and economic impact of federally supported research—but that’s for another day.”
School of Pharmacy
Tuberculosis (TB), an ancient and notoriously difficult disease to treat, has killed millions through the course of human history; and the antibiotics that have been used to fight the disease in recent history are becoming less and less effective. In the face of this reality, Dennis Wright, professor of medicinal chemistry in the University of Connecticut’s Department of Pharmaceutical Sciences, has improved upon a new way to thwart the tricky pathogen, mycobacterium tuberculosis (Mtb). His findings are published today in Cell Press.

Though it may not be apparent in the United States, TB is the leading deadly infectious disease in the world, now surpassing HIV, says Wright. And the areas worst affected by TB are those that are becoming increasingly industrialized, including China, Russia, and India.

Current treatment protocols require the use of multiple drugs, due to the bacteria’s uncanny ability to develop resistance to individual drugs. Drug-resistant strains may be on the rise, due to poor adherence to treatment protocols, says Wright.

“First-line therapy for drug-susceptible TB is by using three to four drugs in combination,” he says. “The mixture is necessary because the pathogen is a master at developing drug resistance.” The treatment time is also at least six months for drug-susceptible strains; but for drug-resistant tuberculosis, it can be 18 months and often longer. Unfortunately, that means adherence to the full treatment, especially in less industrialized areas, is unlikely or impossible for many, Wright says.

At UConn, Wright is taking a new approach, developing drugs that target the bacteria in different ways from previous classes of drugs. He says this approach is intended to help circumvent the pathogen’s resistance to existing drugs.

In recent years, research into the disruption of the folate pathway in Mtb has been explored as a means of treating the infection. The folate pathway is essential for the production of nucleic acids, or the building blocks of DNA and RNA -- the information needed for organisms to reproduce or replicate.

Since it is so important for survival, the folate pathway is also highly conserved -- meaning that antifolate drugs could target bacteria, fungi, parasites, but also humans. Therefore just the right compound is needed to ensure that the pathogen, and not the host, is impacted.

“It is easy to make very potent antifolate compounds, but the challenge is in not impacting the
human folate pathway,” says Wright. “TB is very interesting because even though the folate pathway is highly conserved, there are a lot of differences in Mtb and human throughout the pathway, and those differences are what we are trying to target.”

The promise for antifolate medications as a new class of drugs for the treatment of TB and many other diseases is great. However, there is currently only one antifolate used to treat TB, called para-aminosalicylic acid (PAS).

Wright and his team compared PAS with 60 antifolates they designed to target a very specific component of the folate pathway called dihydrofolate reductase (DHFR). A collaborator screened the compounds in cultures of Mtb, including drug-resistant strains.

“The Mtb and human DHFR enzymes differ very slightly, but in fact, that single amino acid change in the drug binding site is enough to give us selectivity,” says Wright. Not only did the compounds have selectivity in inhibiting the pathogenic DHFR, but they also impacted the ease with which the drug enters the bacterium.

Wright says getting the drugs in is challenging, because TB is one of the hardest microorganisms to penetrate. “It is so drug-resistant due to the waxy outer coating, and because it can hide from the immune system.”

Classical antifolates, like methotrexate, require active transport into cells; however, the compounds developed by Wright and his team enter the cell passively. Wright says the folate cycle may also play a role in the bacterium’s ability to produce its protective waxy coat, meaning that it could make it easier for other drugs to get in and help clear a TB infection.

Wright says that these two findings were validation that the compounds were targeting what they had hoped to target; and overall, the researchers found their compounds to be more effective than PAS.

He is hopeful that funding agencies will be interested in this promising class of drugs. More work is needed to bring them to the market for the treatment of TB.

“As people are traveling more,” he says, “I’m not sure how long TB will stay isolated.”
New research suggests that certain antidepressants increase the likelihood of falls in older adults.

Researchers at the University of Connecticut and Yale University teamed up for these findings, though the cohort is a part of an international effort seeking to evaluate the impact antidepressants have on aging populations.

According to a UConn news release, it is estimated that 15 to 20 percent of all adults over the age of 65 suffer from depression. This number jumps to 50 percent for people who live in nursing homes.

In their research published in Journal of the American Geriatric Society, researchers analyzed a total of 21 studies in which older adults were treated with selective norepinephrine reuptake inhibitors (SNRIs), selective serotonin reuptake inhibitors (SSRIs), other antidepressants, other non-pharmacological methods, or a placebo.

They found that SNRIs — including the drug duloxetine, known under the name brand of Cymbalta — proved to be the most detrimental to older adults.

The team concluded that duloxetine “most likely increases the risk of falls over longer treatment.”

“The goal of this publication is to identify medications that should either be avoided or used with caution in older adults,” said researcher William L. Baker, faculty member at UConn’s School of Pharmacy. “While these are not specific recommendations for which medications to use to treat major depressive disorder in older adults, it does remind clinicians to be cautious when using certain medications and medication classes in this population due to their risk of developing side effects.”
WEIGHING RISKS AND BENEFITS OF DRUG TREATMENT FOR MAJOR DEPRESSION

By American Geriatrics Society

Depression is a common and serious problem for older adults. Some 15 to 20 percent of people aged 65 and older who live independently deal with symptoms of major depressive disorder. For residents of nursing homes, the rates of depression may be as high as 50 percent.

For some people, medication is an effective part of treatment for depression. However, when considering whether to prescribe antidepressant medication for older adults, healthcare providers must weigh the safety risks these medications pose against the often modest benefits they can provide compared to other options.

For example, tools like the American Geriatrics Society (AGS) Beers Criteria for Potentially Inappropriate Medication Use in Older Adults recommended that healthcare providers avoid prescribing certain antidepressant medications to older adults who have a history of falls or fractures. These include selective serotonin reuptake inhibitors (SSRIs) and tricyclic antidepressants (TCAs). That’s because these medications may actually increase the risk of falls and fractures.

Understanding these and other risks associated with “potentially inappropriate medications” is key to building better care for us all as we age. That’s why a team of researchers recently reviewed and analyzed studies to learn more specifically about the harmful effects of antidepressants for treating major depressive disorder in adults 65 years of age or older. Their study was published in the Journal of the American Geriatrics Society.

The systematic review was performed at the University of Connecticut Evidence-based Practice Center (EPC). The researchers reviewed studies that examined how many older adults experienced a harmful event during the study.

The researchers looked at patients 65 years of age or older who are prescribed serotonin and norepinephrine reuptake inhibitors (SNRIs) to treat the acute phase of major depressive disorder (the earliest stage of the condition, when the goal is to address the symptoms associated with an episode of depression). They found that taking SNRIs led to a greater number of harmful events compared to people who took a placebo (a harmless sugar pill that has no effect on health and is prescribed to
some study participants to help with comparing their results to results from people who were treated with actual medication). Older adults who took SSRIs experienced about the same number of harmful events as did people who took a placebo.

The researchers said that taking either SSRIs or SNRIs led to a greater number of people leaving the study due to harmful events of the drugs compared to placebos. They also noted that the drug duloxetine, an SSRI, increased the risk of falls.

“Some of the antidepressants have not been studied in older patients with major depression, and studies don’t often describe specific side effects. Future research in this field is critical to better inform how the safety profiles of different antidepressants compare in older adults,” said study co-author Diana M. Sobieraj, Pharm.D., FCCP, BCPS, Assistant Professor, University of Connecticut School of Pharmacy.

SHOULD YOU BE WORRIED ABOUT THE LATEST DRUG RECALL?

Cancer-causing chemicals in the popular heartburn drug Zantac have led to its removal from store shelves. Here’s what you need to know.

By Mariana Lenharo

you are one of the 75 million Americans suffering from high blood pressure, you may have been affected by the recent recalls of heart medicines found to be contaminated with cancer-causing agents, or carcinogens. Over the past 18 months, hundreds of lots of generic valsartan, losartan, and irbesartan, drugs known as angiotensin II receptor blockers (ARBs), were recalled. And in September, the FDA stated that the same type of impurity was found in medicines used to treat heartburn, including the popular over-the-counter drug Zantac. The alert

Elemental by Medium

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has since led to yet more recalls.

To learn that a medicine you have been taking for years contains unacceptable levels of carcinogens is disturbing. So is the feeling that this has seemingly become a recurrent issue. If you are facing this circumstance, understanding some of the nuances and complexities of this issue might help you stay calm and navigate the decisions you will need to make next, such as consulting your doctor, talking to your pharmacist, checking the lists of contaminant-free drugs, and, ultimately, switching medications.

The contaminants found in the blood pressure and heartburn drugs are chemicals called nitrosamines, especially one named N-Nitrosodimethylamine (NDMA). Studies have found that NDMA can cause cancer in animals, and the compound is classified as “probably carcinogenic” to humans by the International Agency for Research on Cancer. This means that although there is enough evidence from animal studies that NDMA can lead to cancer, the evidence in humans is still limited. (Red meat and certain types of insecticides and herbicides are listed in the same category.)

These nitrosamines are also far more common than we might assume. “NDMA is in virtually all municipal water supplies to some extent,” says C. Michael White, a professor at the University of Connecticut School of Pharmacy. As it turns out, NDMA is a product of water treatment, and levels of up to 0.1 microgram per liter in drinking water are considered acceptable, according to the World Health Organization. It is even present in some of the food we eat, especially smoked products and processed grilled meat, such as bacon and burgers.

But it definitely shouldn’t be in the drugs we take, according to a public statement by Janet Woodcock, director of the Center for Drug Evaluation and Research at the FDA. How these impurities ended up there has been a question that the FDA and some manufacturers have been trying to answer for the past several months.

When it comes to the recently recalled heart meds, the FDA has determined that the problem occurred in the drugs’ manufacturing process. Either the plants used ingredients that formed NDMA under certain conditions or the impurities resulted from the reuse of materials such as solvents (substances that dissolve other chemicals) and catalysts (which precipitate chemical reactions). What may have happened, according to White, is that some manufacturing plants send the used catalysts and solvents to other facilities to be reactivated. In this process, they may be mixed with materials used by other plants that may contain traces of NDMA. When the materials come back to the drug manufacturer, these traces may end up in the drug ingredients.

He believes this type of problem could be avoided if the FDA had been inspecting foreign drug manufacturers with the same rigor directed at U.S. drugmakers. Most ARBs affected by the recent recalls are generic drugs coming from overseas or using active ingredients produced abroad.

Former FDA medical officer David Gortler, now a consultant for the group Former FDA, agrees. “Eighty percent to 90% of generic drugs come from India and China, where FDA inspections are much too lenient,” he says. “One of the reasons these countries can keep their production cost so low is because they are using low-quality, impure chemical reagents, taking shortcuts, and
sidestepping globally recommended quality-control procedures in drug manufacturing.”

In response to this critique, an FDA spokesperson said in an email that the agency identifies the facilities of greatest risk, regardless of their location, and prioritizes those inspections. “The majority of facilities — both in the U.S. and overseas — are operating within the standards U.S. patients deserve,” the spokesperson added.

As for the more recent problem with the heartburn drug ranitidine, including Zantac and other generic versions, the FDA states that it is still investigating the true source of the NDMA impurities. But the main hypothesis is that the issue is not related to manufacturing, as was observed with the blood pressure drugs, but rather chemically related, says the FDA spokesperson, without specifying which chemically related problem is being investigated.

An analysis by Valisure, the pharmacy that first alerted the FDA about the presence of NDMA in ranitidine, suggests that the NDMA is the result of the “inherent instability” of ranitidine molecule.

“At this time, we do not have enough information on the root-cause analysis of any potential ranitidine impurity to be able to provide any further information,” says a spokesperson for Sanofi, the maker of Zantac. “Our evaluations are ongoing on both drug substance (active ingredient) and finished drug product.”

The danger of stopping the blood pressure treatment is perhaps the most concrete risk for people who take these meds.

Regardless of how the cancer-causing impurities got into the drugs, what people really have been wondering about is how much risk they were submitted to. “Our patients are quite tuned in to medical news, so when these stories began to come out, they obviously generated a lot of interest and concern,” says James Januzzi, MD, a member of the board of trustees for the American College of Cardiology.

At this point, it is nearly impossible to measure the burden of risk imposed on each individual patient because of the many uncertainties surrounding the contaminations. For instance, it is unknown since when the drugs have been contaminated. It is also unclear how much NDMA was in each bottle of medicine—not every single lot was tested.

While the FDA considers consuming up to 0.096 micrograms of NDMA per day to be reasonably safe, the levels of contaminants found in the recalled blood pressure medications varied greatly, reaching up to 20 micrograms in a single tablet. But it is hard to pin down what this means in terms of cancer risk. “Although there is no question that, in previous experience, the compound NDMA has been linked to cancer—and the concentrations of NDMA in the generic drugs are clearly higher than the current cutoffs that the FDA would approve—it’s been very difficult to actually find clear evidence for short-term risk for cancer,” Januzzi says.

In an effort to find numbers to translate the increased risk in the long term, the FDA estimated that if 8,000 people took the highest dose of the most contaminated batch of the valsartan drug every day for four years, there would be one additional case of cancer over the lifetime of this group of people. Given that one in every three people in the United States will have cancer in
their lifetime, the additional risk has been considered relatively small.

With the ranitidine heartburn drugs, the levels of NDMA were considerably lower, of up to 0.86 micrograms per tablet, according to FDA tests. Although the amount is higher than the daily acceptable dose, it is not much different from what you would expect to be exposed to if you treated yourself with a generous portion of bacon, for example, according to the FDA.

The fact that the amount of NDMA in ranitidine pills is comparable to what could be found in food goes to show that there is no reason for panic, according to Gary LeRoy, MD, president of the American Academy of Family Physicians. “Are we going to stop grilling burgers because there are very small amounts of NDMA in them? I doubt that very much. People should just take necessary precautions, have discussions with their physicians about alternatives.”

Although it is too early to assess how these events might affect cancer rates in the long term, the recalls are already affecting the lives of those in treatment for heart conditions in other ways. “The most common reaction from patients was of frustration because we needed to switch their medication,” says Januzzi, adding that to get used to a new medicine can be quite a challenge. To make matters worse, because there were dozens of recalls over the course of several months, some had to be switched more than once.

“On individual levels, there were examples of patients that, through the frustration of having to switch from one medicine to the next, often came up with the question: Do I really need to take this medication?” Januzzi says. At the moment, the danger of stopping the blood pressure treatment is perhaps the most concrete risk for people who take these meds. Doctors emphasize that the benefits of heart medications far outweigh what is hypothesized to be a very small increase in the risk for cancer.

The good news is that there are several alternatives to the recalled medications available on the market, both for high blood pressure and for heartburn. “Fortunately, these are not decisions that patients need to take in isolation,” says Caleb Alexander, MD, co-director of the Center for Drug Safety and Effectiveness at the Johns Hopkins Bloomberg School of Public Health. “We are talking about conditions for which there are dozens of options,” he adds.

The FDA recommends that people continue taking what is left of their ARB medicine, even if that lot has been recalled, until a doctor or pharmacist gives you a replacement. To help the general public and health professionals, the FDA has been updating a list of ARB drugs that are currently available on the market. The list states which ones have been found to be nitrosamine-free and which ones the agency has yet to completely assess.

As for the heartburn medications, some alternatives that the FDA has tested and did not contain any NDMA were Pepcid (famotidine), Tagamet (cimetidine), Nexium (esomeprazole), Prevacid (lansoprazole) and Prilosec (omeprazole).

Apart from consulting a health practitioner and switching to a different medication in case yours was recalled, there is no other action you should take. There is no recommendation to screen people for NDMA exposure or for cancers potentially attributed to NDMA, Januzzi says.
One last piece of advice by drug expert Gortler is that people should find one pharmacist they trust and stick to that person for guidance. “One of the big problems is that patients lost their relationship with their pharmacist. People go to a chain drugstore — or worse, mail-order pharmacies — and are unable to choose the option of having a traditional, reliable relationship with a pharmacist.”

Drug safety expert Alexander notes that events like these massive recalls, although they may garner public attention and concern, remain rare. “I don’t think that these events suggest any far-reaching and vast fundamental deficiencies on the part of the FDA, but I do think we can learn from them in order to further improve the drug safety system in the U.S.”
College of Agriculture,
Health and Natural Resources
THE QUEST FOR A TOTALLY AMERICAN CHEESE

Move over, Camembert! Three creameries in the U.S. are developing a recipe for a unique cheese they are calling Cornerstone.

By Josh Kramer, Modern Farmer

If three artisanal cheesemakers in different states followed exactly the same recipe and procedures, would their cheeses taste any different?

That’s the foundational question for Cornerstone cheese. It’s a collaboration engineered to express the native flavors of three creameries in Connecticut, Vermont and Pennsylvania and create a new, totally original American cheese.

One of the participants is Sue Miller, a cheesemaker at Birchrun Hills Farm in Chester Springs, Pennsylvania. Here, in her brand-new facility, is the next phase of artisanal cheese in the United States.
Where does cheese — milk, salt, live cultures (as in yogurt) and a coagulant called rennet — even get its flavor? At Birchrun Hills Farm, it begins in the pasture that Miller’s family has been tending for decades. Black-and-white Holsteins eat their fill of grass here and are milked back at the barn.

Miller indicates where the milk is gravity fed, down through a pipe, right into the cheesemaking vat. This is where Miller makes Cornerstone, just as the other two producers do. As each cheese ages, precise climate and environmental controls allow Miller to tailor humidity and temperature to their desired levels.

It all seems very state of the art, but we’re still on a working farm. Miller directs me to a window with a white streak across it. “A cow got out and licked the window, so I have that charm,” she jokes.

Cornerstone, which was designed in just a few years instead of evolving organically over centuries, is an outlier. Almost all American cheeses are based on European cheeses that are familiar to both producers and consumers. This tends to make the “American Originals” category at the American Cheese Society’s annual competition a bit frustrating.

In 2015, Brian Civitello, a cheesemaker at Mystic Cheese Co. in Lebanon, Connecticut, found himself venting over beers to Miller and Peter Dixon of Parish Hill Creamery in Vermont. The three had about 60 years of cheesemaking experience between them. “I suggested that the three of us — Sue, Peter and myself — come up with a cheese that we define ourselves,” says Civitello. A truly new, unique recipe would have to be simple, stripping cheese down to its essential elements. The cheese would show off the unique taste that is indigenous to each creamery. Civitello and Dixon, who had both consulted in countries with centuries of cheesemaking tradition, including Albania and Macedonia, realized they knew exactly how to do it.

Dixon and his wife, Rachel Schaal, quickly came up with a few guidelines and the name “Cornerstone.” The rules: raw milk from one herd of cows, with salt produced traditionally and as locally as possible, minimally processed animal rennet and — the crucial element — fresh starter cultures produced from the same herd’s milk.

To get started, Miller and Mark Gillman of Cato Corner Farm — brought in when Civitello was sidelined by expansion plans — would have to learn how to make their own starter cultures. Like nearly every cheesemaker in the United States, they were used to buying freeze-dried cultures from large chemical corporations like DuPont. With a little practice and troubleshooting, both began to warm clean, raw milk overnight until it set.

This is a common practice in Europe, even on an industrial scale, and some well-known staples like Parmigiano-Reggiano require it. “Freeze-dried cultures are awfully convenient and easy,” says Gillman. But they are a recent development, he says. “It’s remarkable to me that this is how everybody made cheese until 40 years ago and now very few people do,” he says.

Now, the Cornerstoners say, there are fewer high-quality commercial starter cultures available. Besides assisting in Cornerstone’s hyperlocal recipe, the homemade cultures bring a new level of independence and self-sufficiency to the producers.
“Because we were all doing it together,” says Rachel Schaal at Parish Hill Creamery, “there is this sense of community and collegiality, where we can talk to one another, face problems and figure out solutions together.”

Trying to get the consumer’s attention in a crowded marketplace is also a factor. “You look at wild-ripened beers and the success those have had,” says Gillman. “People are looking for unique and original.”

If Cornerstone takes off, its creators plan to greatly expand the project. “In 10 years, it would be rad to have 20 cheesemakers all making Cornerstone,” says Schaal. The group even plans to allow Cornerstone to be made with milk from other animals and heritage breeds of cow like Ayrshire. At the same time, they’re somewhat wary of unrestricted growth. The group is still considering production limits and how best to assess prospective producers.

For now, at least, it’s still only three creameries. Each is now producing finished “stones” and cracking them open to taste. One opportunity was at the 2018 American Cheese Society (ACS) meeting in Pittsburgh. Many attendees tasted the stones and enjoyed them but found it difficult to compare them. Just the fact that they were very different ages when cut made it hard to assess them. Besides, Cornerstone is so new and without context that no one knows what it’s supposed to taste like.

I’ve had my own opportunity to compare them. Each version has a distinct rind, smell and flavor, but they all have a common sweetness and richness. It’s almost like comparing the flavors of honeycomb, sweet corn and sugar beets.

Since October, Dennis D’Amico, an assistant professor in the department of animal science at the University of Connecticut, has been analyzing microbe samples from each Cornerstone producer. Soon, he will be comparing them with results from a professional tasting panel. The results should help set a microbiotic and flavor baseline for Cornerstone.

Very soon, you may get your own chance to compare stones. Civitello expects to begin making Cornerstone as soon as February, with aged stones that may be ready for the next ACS meeting in August. Miller of Birchrun Hills Farm will also begin making the cheese at her new facility.
Korey Stringer Institute
LOVELL CANYON, Nev. — It was 73 degrees and the early-morning sun was still rising over the Mojave Desert as nearly six dozen long-distance runners gathered at the start line and anxiously watched numbers tick down on the digital clock overhead.

"Make sure that you're staying on top of your internal hydration and your external cooling," the race organizer said into a microphone.

The runners shook their limbs loose and bobbed in place, eager for the start. The annual race is called Running with the Devil, and it takes place less than 30 miles from the glitzy air-conditioned casinos on the Strip in Las Vegas. The forecast called for an unseasonably cool day in the desert, but the racers — running a marathon, 50 kilometers, 50 miles or 100 kilometers — had assembled specifically for a physiological test in the heat.

The whole planet is getting warmer, in fact. Across the globe, the past four years are the warmest on record. Last year the average temperature across Earth's land and ocean surfaces was 1.42 degrees Fahrenheit above the 20th-century average, according to the National Oceanic and Atmospheric Administration, and climate watchers say it's trending in one direction. Climate projections suggest the planet could warm by 3 or 4 degrees Celsius by the end of this century, which would have major ramifications for outdoor sports everywhere, from recreational weekend joggers to elite athletes competing on the biggest stages.

"When you talk about climate change and you tell someone it's a degree hotter — Pfft! — that doesn't seem like very much," explained Andrew Grundstein, a climatologist at the University of Georgia. "When I talk to my students about the difference in a couple degrees, I tell them, 'Remember, when it was 4 degrees..."
From community races to the Olympics to the World Cup, event organizers are already having to make adjustments to competition schedules and start times. And athletes around the world are having to take more precautions as science and technology evolve to help them cope with the heat — or, in some cases, gain a competitive advantage.

Events such as tennis’s Australian Open have instituted safety measures to account for extreme heat. The International Olympic Committee and FIFA have formed committees to study heat-related issues at major events. Next summer’s Olympics in humid Tokyo will feature a marathon that starts at 6 a.m.

This year’s track and field world championships are in scorching-hot Qatar, where organizers will start the marathon at midnight. The World Cup men’s soccer tournament, which usually takes place in June every four years, has been pushed back to November and December when Qatar hosts in 2022 in hopes of cooler weather.

The Running with the Devil race, intentionally scheduled for extreme conditions, might not be an exact peek into the future, but it does highlight many of the challenges already confronting much of the sports world. How does heat affect performance? What dangers lurk on the outdoor courses and fields exposed to the summer sun? How does one stage a safe event in extreme conditions?

The racers had various strategies, and at the start line, they wore long sleeves or no sleeves or no shirts, some armed with backpacks, running belts and water bottles. They stared ahead at a desolate one-lane road with regular mile-markers and irregular roadkill. The landscape was a blend of browns and greens with Joshua trees, rabbitbrush and Ponderosa pines lining the route, chipmunks, lizards and rabbits providing the only company.

Finally, at 7 a.m.: “Going off in 5, 4, 3, 2, 1 — Go!” the race director said to the sound of claps and cowbells that rang out in an otherwise quiet, empty, warming desert.

‘It’s pretty extreme’

It was 95 degrees and sticky in Orlando but 30 degrees cooler inside air-conditioned Orange County Convention Center. A crowd of more than 6,000 gathered in late spring for the annual meeting of the American College of Sports Medicine, the largest such gathering in the world.

Heat-related topics have become a staple of these meetings, and about 200 people — athletic trainers, doctors, researchers, physiologists and performance coaches among them — gathered in Room 303 for a presentation focused on next summer’s Olympics. Doug Casa, head of the Korey Stringer Institute who serves on a commission dedicated to heat-related issues for the Tokyo Games, offered the crowd a brief history lesson.

“The 1964 Tokyo Olympics, they moved to October because of the brutal heat in Tokyo,” he said. “Well, it’s hotter in Tokyo now than it was back in 1964. … There’s no movement this year. It’s happening at the end of July and August in the most brutal conditions that you can imagine.”

With an anticipated average temperature of nearly 90 degrees and humidity topping 55 percent, the Olympics will be
on par with some of the hottest athletic events ever staged.

“It’ll be the hottest Summer Olympics in history,” Casa said. “It’s pretty extreme.”

The professionals in the large conference room assembled to discuss ways to keep the world’s best athletes safe and somehow maximize performance in such difficult conditions. Endurance athletes with prolonged exposure are more susceptible to the dangers posed by heat, while some athletes — sprinters, for example — might actually perform better. But almost any athlete competing outdoors will face risks.

One key to competing in heat is for athletes to acclimatize — to arrive at the destination early and exercise for at least seven to 10 days in the hot conditions. The prolonged exposure allows the athlete’s body to adjust: Plasma volume increases, heart rate decreases, sweat rate increases, and skin and core temperatures stabilize.

Among those in the Orlando crowd was Randy Wilber, the chief physiologist for the U.S. Olympic & Paralympic Committee who has worked with Team USA athletes since 1993. He has been considering all of these factors since Tokyo was awarded hosting rights in 2013.

“The bottom line is it’s going to be very hot, very humid. That’s not any surprise,” he said. “It’s how you react to it that matters.”

Wilber has already devised heat plans with his U.S. colleagues. The Tokyo conditions might not lend themselves to world records in many events, but coaches, athletic trainers and physiologists can still help get the athletes onto the podium.

“If we do this right — if we prepare for the heat and humidity right — we could beat some people who would normally blow us up,” Wilber said. “So that’s a pillar of our strategy: If we can out-science our opponents, our chances of doing better are good because these are things that some people won’t pay as much attention to.”

To that end, the various U.S. teams have mostly sorted out travel plans so athletes will arrive well ahead of the Opening Ceremonies, as early as two weeks for some sports. Some will attend training camps in the region, and they’ll also utilize a U.S. training center in Tokyo.

Those who compete in some outdoor sports, such as the track and field athletes, will be sized for specially engineered ice vests. They’ll be encouraged to wear the vests on bus rides to the stadium, during their pre-competition warm-up, in the staging area and then again post-event to cool down.

“Our job is to make sure they’re prepared for any situation and their body is ready for the heat and humidity on competition day,” Wilber said.

Oppressive heat

It was 82 degrees under the cloudless sky as the runners on the desert course began to feel the midday heat. Virtually any training run in Nevada can be dangerous, especially for those who aren’t acclimatized and if conditions and hydration levels aren’t closely monitored.

Runners have had to be airlifted off the Running with the Devil course before, and the 2013 race was canceled altogether when the forecast called for 117-degree heat. Organizers know they have to take precautions, and water jugs and aid stations are located about every three miles, with more than 3,000 pounds of
ice available along the course.

At one station, about halfway through his 100-kilometer race, Martin Gruebele, 55, asked for another scoop of ice for his hat as he prepared for a steep incline. “When that baby runs out, I am walking,” he said, setting the hat atop his head.

As the temperature climbed, race volunteers kept a closer eye on the runners. The ACSM recommends halting any training and practice activities at 90 degrees. That’s a familiar temperature in the Mojave Desert, but Grundstein, the Georgia climatologist, led a 2013 study that suggests the entire country will be experiencing more dangerously hot days in the future and the sports world needs to ready itself.

“Expected climate change will lead to a considerable increase in the frequency of days with conditions deemed unsuitable for sports activity across much of the U.S.,” the study found.

The Southeast, the Gulf Coast and Arizona could average 30 to 50 days of oppressive heat in some areas — and as many as 85 such days in some spots. Other areas, such as New England, the Pacific Northwest or the upper Midwest, which presently have fewer than five oppressive days annually, could see 15 to 30 per year. Just last week, the temperature in Alaska hit 90 degrees for the first time in recorded history.

In the desert, only the ultramarathoners were left by late afternoon as temperatures started peaking. Many of the runners who registered were curious to learn how their bodies respond to the heat. Gruebele is a renowned biophysicist who studies animal motion. “Might as well do some experiments on yourself,” he said.

In last year’s race, he had struggled in the heat, losing eight pounds. He dropped down in distance from 100 miles to 50 and found himself crawling across the finish line.

He was armed with a new prerace strategy — Gruebele did sauna training to increase his heat tolerance — and was determined to conquer the elements. He felt he was finally appreciating the complicated, substantial impact heat has on an athlete’s body.

**Athlete vs. body**

It was 59 degrees outside on a May afternoon in Storrs, Conn., but behind a giant door that looks better-suited for a bank vault, the temperature was cranked way up.

Julie Dunkle, 52, had traveled across the country because she wasn’t happy with how her body had been responding to heat. Dunkle is a triathlete who builds her year around the Ironman World Championship in Kailua-Kona, Hawaii. It’s one of the most demanding sporting events on the planet and takes place in some of the most unforgiving conditions. It starts with a 2.4-mile open water swim, followed by 112 miles on a bike and then capped with a 26.2-mile marathon run. It all unfolds in heat and humidity that wraps itself around competitors and squeezes until they can barely breathe.

Dunkle has competed in all types of conditions. But at the Ironman, her body fails her, her muscles seize, and her stomach turns into a blender. She sweats profusely and vomits a half-dozen times or more. She has lost as much as 11 pounds over the course of a race.

Her body is a puzzle Dunkle keeps trying to solve, so she came to the Korey Stringer Institute at the University of Connecticut for two days of heat testing.
She was sealed into the climate chamber, where staffers were able to mimic the Ironman conditions: 91 degrees with 63 percent humidity.

“It feels just like Kona,” Dunkle thought when she stepped inside the small room 5,000 miles from Hawaii.

The chamber allows staff members to re-create environmental conditions from anywhere on the planet. The goal is to put athletes in those extreme conditions and monitor how their bodies respond.

“If your temperature is 102.5 instead of 104, you’re going to perform better. It’s that simple,” said Casa, head of the institute. “Because if your temperature is lower, you’re not sending much blood to the skin surface, and there’s more blood for your heart and your muscles.”

Dunkle was nearing the end of a two-hour bike ride, and her temperature kept inching upward and reached 102.6. She had lost about a half-gallon of fluids, much more than she could replace.

“How you feeling?” asked Robert Huggins, the lab’s president of research and athlete performance and safety.

“Not great,” she said. “I feel thirsty, but I can’t drink anymore.”

As her temperature rose, her power output fell, unable to maintain her target pace.

“Think of it like a car,” Huggins explained. “How fast can I make the engine go without making it overheat?”

As extreme heat becomes more prevalent and events are increasingly staged in oppressive conditions, athletes who struggle in heat can expect to see their performances affected and will need to take added precautions in training and during competition.

Heat stroke generally strikes when the body temperature reaches 104 degrees. When the body can no longer cool itself, blood stops reaching vital organs and the brain, heart, kidneys, lungs, liver and muscles can begin to malfunction. The symptoms can vary, but with the central nervous system compromised, athletes can experience dizziness, fatigue, headaches, seizures and nausea. They could pass out and lose consciousness altogether.

Unlike cars, humans don’t come equipped with a temperature gauge to know when they’re entering dangerous territory. Casa said there are two “holy grail” pieces of technology that could be on the market in the next couple of years: a wearable assessment that measures an athlete’s hydration status and another that offers real-time monitoring of core body temperature. Within the next few years, Casa said athletes will be able to swallow a capsule that can transmit data to a smartphone, watch or bracelet.

After a brief rest, Dunkle began running on a treadmill. Barely 40 minutes in, that familiar feeling bubbled in her stomach. Her heart rate reached 170 beats per minute. She saw black spots, and her head started pounding. Dunkle stepped off the treadmill and buried her face in a towel. She was done for the day.

“That sensation you felt, that’s your body telling you that you’re getting too hot,” Huggins told her.

Dunkle’s body temperature had reached 103.9 degrees and was still climbing, and she had lost 6.7 pounds — 4 percent of her body mass — in 2½ hours of exercise.
A month later, Dunkle and Huggins got on the phone to discuss the test results. He recommended she avoid hot races. If she insisted, he told her that she needed to slow down.

Dunkle was close to tears. “Why even try again?” she thought.

But she also knew she couldn’t just quit. She planned to arrive in Hawaii three weeks early for October’s Ironman, allowing her time to acclimatize, and then hope that on race day conditions are favorable and her body agreeable.

The way she sees it, it’s not just her trying to conquer an island; it’s an athlete battling her body.

‘More pain than I’ve ever been in’

It was 90 degrees in the late afternoon back in the desert. As the sun dipped lower, shadows began appearing along the course and runners were reduced to walking for long stretches.

Ryan Moshinsky took respite in a folding chair at one aid station, momentarily contemplating life and the decisions that had brought him here. The 21-year-old was the youngest ultra runner in the field. He had never even entered a marathon before, but Moshinsky had targeted Running with the Devil a year earlier, ambitiously registering for the 50-miler.

But running near his home in the Chicago suburbs is not quite like the desert, and the race was unfurling all of its weapons on the young runner. To avoid chafing, he chose to run shirtless, which left him directly exposed to the sun. After 23 miles, he threw up part of his sandwich and couldn’t stomach another bite. Around 26 miles, his legs began throbbing. Then around Mile 37, his chest and neck started aching, and Moshinsky thought he was finished.

“More pain than I’ve ever been in my life,” he said.

Moshinsky was nauseous and his gait was more of a stumble. He was alone in the desert for long stretches, but at the 44-mile mark, he was permitted a pacer, and a cousin walked with him for three miles before his mother took over for a final leg.

“I brought him into this world; I’m taking him to the finish line,” Susan Moshinsky announced.

The two walked side by side, with Susan telling jokes and stories to keep her son alert. Only a dozen racers remained on the course. Unlike last year, Gruebele cruised through 100 kilometers. He lost only one pound this time, though truth be told, he wished it had been hotter.

Heat affects competitors differently. Rising temperatures have forced athletes and event organizers to make major changes and, at times, lower expectations. Moshinsky had come too far to quit. He splashed water on his arms and shielded his head and shoulders from the sun with a towel. With a quarter-mile left, Moshinsky started running again, sensing the finish line was near.

More than 11 hours 12 minutes after he started, Moshinsky’s run in the sun was finally over. It was down to 80 degrees, but the dry desert air felt hotter. He had just enough strength left to briefly lift his arms in the air before collapsing into a chair.

“Sit down,” his mother implored. “I love you, but don’t do that again. You’ll give me a heart attack.”
It’s hot outside — and it’s about to get a lot hotter for millions of Americans this weekend. The National Weather Service has issued excessive heat watches, warnings and advisories in the Plains, Midwest and parts of the East Coast. More heat alerts are expected later this week, as temperatures in cities like Chicago, Philadelphia and Washington, D.C. could reach 100 degrees.

What can you do to stay cool? Aside from staying indoors, in air conditioning, keeping your body well hydrated is key to staying healthy during a heat wave.

Heat can sometimes be very subtle in how it affects the body. If you’re out in the sun, it can take just 30 minutes or up to a few hours for the heat to cause dehydration, nausea or trouble concentrating, said Dr. Corey Slovis, chairman of emergency medicine at Vanderbilt Medical Center.

Dehydration is a serious health concern. A recent study published in the American Journal of Public Health found that more than half of all children and adolescents in the U.S. aren’t getting enough water.

“People don’t realize the amount of fluid they can lose in the heat, or while exercising,” explained Michael F. Bergeron, Ph.D., and president and chief executive officer of Youth Sports of the Americas. “And it’s important to note that your hydration needs are very individual,” said Bergeron.

This health issue is more serious than you might think and could land you in the hospital.

Heat stroke occurs when the body temperature gets above 105 degrees. “One of the earliest signs of a heat-related illness is just not feeling right,” said Slovis. “There’s no one specific symptom.”

How much liquid do we need each day? It depends. Here are a few signs you might be dehydrated and tips to stay healthy all summer long.

1. Increased thirst and a dry or sticky mouth

“If you feel thirsty, you’re already dehydrated,” explained Dr. Laura Goldberg of Cleveland Clinic Sports Health. The easiest remedy is to start...
drinking water (and beverages with electrolytes) as soon as you notice this, but try not to let yourself get to this point.

The best way to prevent this from happening is to meet your daily hydration needs, for women, the National Academy of Sciences recommends 2.7 liters of water a day (about 11.4 cups), and for men, 3.7 liters (15 cups). Try to drink more water if you've spent excessive time in the sun, or exercising.

2. Signs of fatigue, confusion or anger

Studies have found that mild levels of dehydration can affect your mood and cognitive functions. This is especially common in the young or elderly, who may seem less alert, or forgetful.

A study from the University of Connecticut Human Performance Laboratory found that even mild dehydration can alter a person mood, energy and ability to think clearly. The researchers defined mild dehydration as an approximately 1.5% loss in normal water volume in the body — and the adverse reaction is the same whether you're exercising or sitting still.

3. Dry eyes or blurred vision

“When you've been exercising for a long time, you're sweating and your overall body fluid goes down — this can result in dry eyes or blurred vision,” said Goldberg, who also noted that any part of the body that is normally moist is going to feel dry or irritated.

“Monitor your hydration levels and make sure you’re drinking throughout any form of exercise,” she explained further.

4. Headaches or disorientation

Dehydration can result in a headache or migraine, light headedness or delirium. “I’ve seen marathon runners running in zigzags because they’re dehydrated. You can’t make decisions and feel delirious,” elaborated Goldberg.

“You may also experience weakness, dizziness, or nausea, because the body doesn’t have enough fluid to send to other parts of the body. This could also result in heat exhaustion. You can collapse if you don’t stop exercising and cool down,” warned Bergeron, who also added that these specific symptoms can also be signs of over hydration, so be aware of how much you’re drinking.

5. Muscle cramps

“If you’ve been exercising, it’s natural for your legs to feel tired, but if it’s more than that and you’re experiencing muscle cramping, that’s a serious sign of dehydration,” Goldberg explained. This is because of the loss of water and salt in the body — you also might experience tightness in your muscles, instead of cramping.

“Wandering and progressively widespread muscle cramping is a certain clue of a sodium deficit and dehydration in the fluid spaces surrounding certain muscles,” Bergeron elaborated. “But don’t confuse it with an overworked muscle which would just affect a small area.”

To prevent this from occurring, it’s important to drink sports beverages that contain sodium, or snack on salted pretzels or low-fat cheeses. The sodium helps your body to re-hydrate and retain the water.

6. Lack of sweat

According to Goldberg, this is one of the more serious signs of dehydration. It means your body is in dire need of water.
Though, on the other hand, Bergeron notes that more likely it may be a sign of overheating or heat stroke — though either can occur in the presence of continued sweating. Either way, it’s crucial to cool down rapidly if you’re not sweating anymore.

7. Dark urine
“Straw-colored or light yellow urine means you’re properly hydrated. If your urine is dark, or if there's blood in your pee, you need to stop exercising immediately,” warned Goldberg. Notably, perfectly clear urine may mean that you are over-hydrated.

8. Fever
“Dehydration can lead to hyperthermia and a fever-like symptoms (e.g. chills) because over-heating can alter your body’s normal temperature ‘set point,’” explained Goldberg. Excessive overheating is an urgent red flag. Stop exercising immediately, take an ice bath and hydrate.

9. Shriveled and dry skin
If your skin is hydrated, it will appear doughy. If you’re dehydrated, your skin will lack elasticity and won’t bounce back. “If you pinch your skin and it appears thin and doesn’t melt back onto your body quickly, you’re dehydrated,” said Goldberg.

Some key things to remember when exercising in the summer is that the longer you’re working out, the more water you need. Also, plain water is good for you, but a combination of water, electrolytes and sodium is really the best way to stay hydrated.

It’s also crucial to understand that hydrating properly isn’t 100% preventative, if you’re working too hard and too long in the summer heat, you can still overheat no matter how much water your drinking. So be aware of your body, and stop what you’re doing if you notice any of these symptoms. ●
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It’s also crucial to understand that hydrating properly isn’t 100% preventative, if you’re working too hard and too long in the summer heat, you can still overheat no matter how much water your drinking. So be aware of your body, and stop what you’re doing if you notice any of these symptoms.
You put in the work. You put out a ton of sweat. Surely, you’ve lost weight, right? Downer alert: Sweating only sort of helps you lose weight. Technically, sweating can take your weight down, which explains why sauna suits are popular with people like wrestlers who need to make weight in a hurry. If you sweat out 20 ounces of fluid, you’ll “lose” 20 ounces on the scale.

But you’ll bring those pounds right back on when you down that much water after your workout (which you should do), explains Robert A. Huggins, Ph.D., president of research and athlete performance and safety at the Korey Stringer Institute at the University of Connecticut. “It’s not fat mass, which is the weight most people have the goal of losing,” he says.

Of course, over time, working out consistently can help you lose weight, but you can’t judge how effective your workout is just by how much you sweat.

Wait, more sweat doesn’t mean you got a better workout?

Shedding a lot of sweat isn’t the main indicator that you worked hard. True, the harder you work out, the more you’ll sweat. But fluid loss doesn’t tell you the whole story.

“Each person has their own sweat rate, and it can change over time,” says Huggins. So the guy next to you on the treadmill sweating buckets isn’t necessarily outpacing you. On top of that, how much you sweat can depend on a number of things:

How to lose weight by sweating

In order to do a quality workout that actually will burn calories or build muscle, you have to replace the fluid you’re losing. Otherwise, your heart rate will go up and your body will likely slow down during that workout, which isn’t going to help you get the weight loss workout you were going for.

Here’s how it works: “You have a set amount of blood that has to go to multiple places when you’re working out—it needs to go to your brain, your muscles, and your skin for cooling,” Huggins says. When you sweat, your blood volume decreases if you don’t replace the fluids you’re losing. Your brain, muscles, and skin still need it,
but now there’s less to go around. So your heart rate increases, your workout feels harder, and you’ll probably slow down (or pass out if you really don’t pay attention to what it’s telling you).

The ultimate way to keep your workout going during that session as well as day after day is to replace what you lost with this simple move, says Huggins.

1. Weigh yourself naked before your workout; hold the bottles you’ll drink during the workout.

2. Weigh yourself after the workout.

3. The before/after difference is how much fluid you lost, meaning how much you’ll want to replace before the next session.

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**DANGEROUS HEAT FALLS MOSTLY ON TEXAS, PUTTING TOP ATHLETES AT RISK**

Heat and humidity blister the Lone Star State and much of the U.S. southern rim, an analysis finds

By Eric Roston, with assistance by Eben Novy-Williams, and Brian K Sullivan

On Tuesday afternoon, the Texas Rangers and the Los Angeles Angels were the hottest teams in baseball. A high-pressure system pushed the temperature in Arlington to 103 degrees Fahrenheit. With the humidity, it felt like 110.

Jamie Reed, the Rangers’ senior director of medical operations, gave players the usual advice: Keep drinking and load up on foods with greater water content.

The temperature trends in Texas, though, are anything but usual. America’s meteorologists issue excessive heat warnings when the heat index—designed to capture the feeling outside in the shade, with a light breeze—surges past 105 degrees for more than two hours.

Texas is home to six of the 10 U.S. cities...
with the largest increase in excessive-heat days, including Houston and Austin.

Even in ostensibly cooler places, the temperature is rising. Dallas now sees about 14.5 more days above 90 degrees than it did in 1979, according to a new analysis by the research nonprofit Climate Central.

Overheating Texas cities outrank those in neighboring states by a considerable margin. McAllen, in the state’s south, has seen 31.6 more 90-degree days since 1979. Tyler, about 100 miles southeast of Dallas, comes in seventh, with 22.1 more scorchers. These cities endure further hardship when humidity enters the mix, which is the focus of the Climate Central analysis. Being out in the sun, as athletes usually are, can add 15 degrees to the experience.

Stay Hydrated

It’s not news that Texas gets hot. It’s news that it’s gotten so much hotter just since “We Are Family” was the song of the summer. The Climate Central analysis dates to 1979, when the University of Idaho’s gridMET temperature database begins. The study uses methodology similar to a U.S. heat analysis earlier this summer, led by Kristina Dahl, a senior climate scientist at the nonprofit Union of Concerned Scientists.

“What’s great about this study is that it takes a look at how conditions have changed in our lifetime,” Dahl said of the new analysis. Texas already has a lot of days in the high 80s. “They just need a little bit of a nudge from global warming to get over that 90-degree threshold.”

Such extreme heat can be deadly, especially under conditions of high exertion. Korey Stringer, a Minnesota Vikings offensive lineman, died of heat stroke during training camp in August in 2001. The University of Connecticut in 2010 opened the Korey Stringer Institute to focus on research, education, and advocacy to protect athletes, soldiers and workers from what’s called exertional heat stroke and other heat-related dangers.

The institute scores states based on their adherence to a set of policies that states prevent high-school athletes from heat-related illness. Low- or no-cost precautions include developing an emergency plan, acclimating players to higher temperatures well before a game and having a cold-water tank on hand in case someone overheats, said Doug Casa, CEO of the Korey Stringer Institute.

Texas teams have developed their own strategies to protect their players. Texas institutions have rapidly moved to bring outdoor athletics indoors. A 2016 Dallas Morning News report found that in the previous 20 years, Texans had spent about $500 million on 144 indoor practice facilities. In 2000, there were just 23 such facilities.

Heating Streak

The Rangers provide players with an air-conditioned room just off the dugout. There’s a weather bulletin in the locker room when they enter, and water or electrolyte-heavy drinks are widely available. Restrooms even feature color-coded urine charts so that a player can check his hue and see if he’s drinking enough.

The heat is rough on fans as well. Attendance for Tuesday’s day-game with the Angels was just 17,000, roughly 10,000 lower than the season’s average. The Angels won 5-1, then lost 3-2 in the nightcap. Next year, everyone will win: the Rangers’ new air-conditioned ballpark is scheduled to open during the 2020 season.
“The key thing for people’s outcome is the number of minutes their temperature is over 105 degrees,” says Douglas Casa, CEO of the University of Connecticut’s Korey Stringer Institute, named after the Minnesota Vikings offensive lineman who died of heatstroke during an August 2001 training camp. Survival is highly likely if the core temperature is brought below 104 degrees within 30 minutes. Here are Casa’s tips on prevention and treatment.

1. Avoid exercising in high temperatures, or choose cooler parts of the day and stay in the shade. If you do exercise in the heat, wear pale-colored, loose-fitting, lightweight clothing, and acclimate to the conditions by gradually increasing your output over 7 to 14 days.

2. How much water to drink is the subject of some debate. For recreational athletes, Casa suggests hydrating based on thirst. High-level endurance athletes should account for other factors, such as sweat rate. Avoid drinking alcohol before and during strenuous outings.

3. Heatstroke symptoms vary. Many victims are still conscious, and some have seizures or vomit while others do not. Suspect heatstroke if the person can no longer support their body weight, speaks irrationally, or is hyper-irritable or confused. (Casa knows of heatstroke victims who punched a police officer at the finish line of a race.) To get a true reading of core temperature, use a rectal thermometer.

4. “Cool first, transport second” is the operable concept when it comes to heatstroke. With mere minutes to act, a victim should be cooled down before being taken to an emergency room. Immersing the body in a cold bath lowers temperature the fastest, dropping it one degree every three minutes if the water is circulating.

5. Exertional heatstroke in the backcountry presents additional challenges. Anything that cools the victim is helpful, but the best options are to immerse them in a lake, river, or stream, or wrap them in fabric drenched with ice water from a cooler. It’s important to cool as much of the body’s surface area as possible. In the absence of cold water, seek shade, wet the person’s clothing with your water bottle, and fan them.
The vast majority of American youth who die suddenly while playing sports are middle school age children who experience a cardiac event, according to a new study by the National Athletic Trainer’s Association.

Researchers examined 45 sudden sports deaths that occurred between 2007 and 2015 among children ages 6 to 17. Sudden cardiac events caused 76 percent of the deaths. Most of the victims – no matter the cause – were between the ages of 12 and 14.

The most-sudden youth sports deaths – 36 percent – came on the basketball court. Baseball and football each accounted for another 16 percent while soccer accounted for another 13 percent.

States generally require that high school athletes complete a sports physical with a medical care provider before participating in school-sanctioned sports, according to Dr. David Shipon, director of preventive and sports cardiology for Jefferson Health.

But he said those standards are looser at younger ages, primarily because experts believe the risk of sudden cardiac arrest is greater among high school and college athletes.

“This article puts that into question,” said Shipon, who was not involved with the study. “Is it truly higher risk or is it that we never really had the true data?”

More research – and better databases, including those on sudden cardiac arrest – are needed to truly understand the situation, Shipon said.

There is no streamlined database that documents sudden deaths in youth sports. Therefore, the researchers compiled their data by searching for deaths reported by media outlets.

Still, many of the findings of this study mirror the research on high school and collegiate athletes, Shipon said. It suggests that states should consider requiring middle school athletes to complete a pre-participation examination, too.

“The issue is that middle school sports has a less structured policy than high school sports when it comes to a pre-
participation physical,” Shipon said. “There is less emphasis on this issues, likely because a lot of these kids are playing in recreational sports. They’re playing outside of the school.”

About 58 percent of the sudden deaths occurred among organized middle school sports and clubs, researchers found. Another 40 percent happened in recreational and youth sports leagues.

CARDIO CHECK-UP

“The question always comes up – is there a way to predict these events?” said Dr. Neel Chokshi, medical director of Penn’s Sports Cardiology and Fitness Program, who was not involved with the study. “Could we have identified these kids ahead of time? That’s a really difficult question that a lot of people are trying to address.”

Having youth athletes complete a pre-participation physical could potentially help reduce sudden deaths, Chokshi said. But he cautioned that screenings do not always identify predisposition to sudden cardiac arrest. Sometimes, it takes participating in athletics for those signs to become apparent.

“The best option is to just be prepared on the really rare instance that such an event would occur,” Chokshi said.

That includes having defibrillators on hand at athletic events – and people who are trained to use them and administer CPR. Organizations like Simon’s Heart, a nonprofit based in Lafayette Hill, Montgomery County, have worked to reduce the challenges associated with providing these lifesaving measures.

NATA President Tory Lindley urged all organized sports leagues to adopt policies that will reduce youth deaths, stressing that sudden cardiac death is preventable.

“While high school and college sports usually get the spotlight when it comes to the prevention of catastrophic health and injury events, this study confirms the need to extend best practices and policies to the youth and recreational levels to protect all youth athletes,” Lindley said in a statement.

More than two-thirds of sudden deaths happened during practice, researchers found. About 80 percent of the victims were male. Previous research showed that incident rates for sudden cardiac arrest are highest among African-American males.

NATA and the National Basketball Athletic Trainers Association jointly released a series of recommendations that could help prevent future deaths.

They urged parents to ensure their athletes get a checkup from a medical provider trained in detecting cardiovascular problems before they begin playing basketball – even if such an evaluation is not required by the school or league.

The associations also suggested parents ask whether a medical trainer and someone certified in CPR will attend practices and games. Additionally, parents should inquire about venue-specific emergency plans that outline the actions to be taken in case of an emergency.

The study was conducted by researchers at the University of Connecticut’s Korey Stringer Institute. A former NFL lineman, Stringer died after suffering heat stroke during training camp in 2001. NATA published the findings in its Journal of Athletic Training.
12 NATURAL WAYS TO GET RID OF YOUR STRESS

Being bothered by stress is no fun

By Theresa T. Daley

Being bothered by stress is no fun, and unfortunately almost everyone has to deal with it. You can even get spontaneously bothered by clammy hands, shallow breathing and a heart raging. Fortunately, there are a number of things that you can initially do yourself to get this under control.

1. Work out

Various studies have shown that exercising is one of the best ways to get rid of stress. Nearly 3000 participants with different medical conditions were examined at the University of Georgia, which showed that participants who exercised regularly reduced their stress by 20 percent. The researchers also found that exercise helped participants who had no serious stress complaints. According to the National Institutes of Health you can do the best in jogging, swimming, cycling or walking to get rid of your complaints.

2. Take a deep breath

It may sound obvious, but when you take the time to breathe in and out deeply, your stress attack may fade away. By breathing through your stomach for 20 to 30 minutes a day – which you can do by breathing slowly, deeply and regularly – your brain gets more oxygen. This stimulates your nervous system and allows your body to relax. So breathe in, breathe out ...

3. Warm yourself up

Heat makes you feel comfortable. A study published in the Journal of Psychopharmacology showed that warm sensations cause serotonin to be released into your brain, a neurotransmitter that regulates your mood. A Japanese study also showed that participants saw their stress complaints subside after a visit to the sauna. Good excuse for a spa day, isn’t it?

4. Go for a walk

A long walk can also help prevent stress. According to a study at Stanford University, surrounded by nature can ensure that your symptoms decrease. The researchers studied the mood of 60 people before and after taking a 50-minute walk. They found that people who took a walk through nature felt less anxious afterwards than the people who had walked through the city. Research has also shown that spending time in a green space reduces the activity in a part of your brain that is associated with depression and mental illness. Forest walk, any one?
5. Meditate

It is probably no surprise: meditation can also help you in many different ways. Even 30 minutes of zen time a day does a lot. The discipline you need for meditation (such as focusing on your breathing, thoughts and feelings without forming an opinion about it) can help you to eliminate negative emotions. Zennnnn ...

6. Take a Shower

Hot showers are nice and all that, but don’t sleep with the benefits of a refreshing, cold rinse! A cold shower (even a short one) increases the blood circulation in the body, waking you up and making you feel more alert and energetic. During a cold shower, your body also releases endorphins, known as one of our “happy” hormones.

7. Eat oily fish

Fish that is rich in omega-3 fats is not only good for your heart, it can also help you control your fears. Now an omega-3 supplement like a fish oil tablet will not help you any further: you can get the best omega-3 fats from the source: try to eat oily fish three times a week, such as salmon, trout or sardines.

8. Listen to your favorite music

It could also help to listen to soothing music. According to an Australian study, listening to relaxing music before doing something stressful helps calm your nervous system. It would even help better than trying to relax in silence! Choose something that makes you feel good, be it hardstyle, acoustic music or punk rock – everyone relaxes in their own way!

9. Get excited

Do you have to do something that makes sweat fall on your back? Then try to hyped yourself a little before you start. By saying “I am excited” instead of trying to relax you could perform even better, according to a study by the American Psychological Association. Come on with that personal pep talk!

10. Go to sleep

A good night’s sleep is essential if you want to prevent stress. Research has shown that a sleep deprivation is associated with depression, and anxiety and panic attacks. It’s just not clear if the panic attacks keep you awake at night or if a lack of sleep increases the chance of panic attacks. In any case, the National Sleep Foundation recommends that you sleep seven to nine hours a night to prevent symptoms. Do you have trouble relaxing before you go to sleep? Then try these tips to fall asleep faster.

11. Go stretch

Doing yoga exercises to stretch your muscles can do a lot of good. A study published in the Journal of Alternative and Complementary Medicine has shown that after three months a group of participants who practiced yoga three times a week were less troubled by their fears and attacks than a group of participants who had three times a week went for a walk. Pull out your yoga mat!

12. Drink plenty of water

Do you feel weak? Drink at least enough water! According to a study at the University of Connecticut, participants suffering from mild dehydration felt very anxious after walking for 40 minutes on a treadmill. They were also less able to think clearly and their energy levels became very low, making you feel even more anxious.

Do all the above tips not help? Then it might be wise to seek professional help. If your symptoms get worse and worse, you may have to set up a personal plan with a therapist to get rid of your symptoms.
College of Engineering
SAN FRANCISCO, CALIFORNIA—On a warm March day here, you could almost mistake Rob McGinnis for a huckster newly arrived in a frontier town as he delivers a rapid-fire pitch to an audience of thousands of would-be investors. McGinnis, a chemical engineer and entrepreneur, isn’t hawking snake oil, however: His elixir is gasoline. Nearly everyone in the developed world is hopelessly addicted to it. Collectively, we use nearly 3 trillion liters every year.

At the pitch fair, McGinnis wears the Silicon Valley entrepreneur uniform of jeans, a black T-shirt, and black leather biker boots. On a theater-size stage, he delivers his spiel, sandwiched between 3-minute presentations for an online personalized clothing store and an outfit that would rent scooters by the month. “We make gasoline from air, water, and electricity,” McGinnis announces. “Today, gasoline sells for $3.50 a gallon in California. Next year, we will be selling it for $3 per gallon.” Other startups peddling ideas at the pitch fest foresee markets in the billions, but McGinnis aims higher. “We’re talking about a $2 trillion [per year] gasoline market,” he says.

If all that sounds too good to be true, it might be. “I hope they’re right,” says Olgica Bakajin, CEO of Porifera Inc., a San Leandro, California, company that has also worked on systems like those at the heart of McGinnis’s fuelmaker. But she notes that McGinnis “is a good talker who sells things well.”

He has convinced some powerful investors. In December 2018, he received $150,000 from Y Combinator, the Mountain View, California, seed funder hosting the pitch fair, to build a prototype of his air-to-gasoline–maker. The result was a refrigerator-size contraption of catalysts, tubes, electronics, and filters, assembled a week before the pitch fest.

But before the demo, the machine sprung a leak. Although it wasn’t operating at the pitch fest, McGinnis’s optimism was. He promised audience members that the repaired device would extract carbon dioxide (CO2) from the air, add it to water, and use a catalyst to rearrange the chemical bonds to make hydrocarbons. The result: fossil fuel without the fossils. “It can sound like magic, but it’s really just chemistry,” McGinnis told the audience.

A Promethean project
Synthesizing gasoline, instead of refining it from oil, isn’t a new idea. German
chemists in the 1920s discovered they could turn coal into carbon monoxide (CO) and hydrogen—a combination known as synthesis gas. Catalysts, along with heat and pressure, could then transform synthesis gas into gasoline and other liquid hydrocarbons.

But McGinnis’s setup requires no heat, pressure, or coal. It uses only air, water, and electricity, which can come from the sun or wind. And with those renewable resources becoming ever cheaper, he’s betting he can deliver gasoline more economically—and far more cleanly—than companies that must find oil, drill for it, ship it, and refine it.

Several other startups and academic labs are pursuing the same dream. “There has been a lot of progress in the last few years” in turning CO2 into more complex compounds, says Peidong Yang, a pioneer in the field at the University of California, Berkeley.

Yet many of those efforts have stumbled over the expensive, energy-intensive steps needed to separate the hydrocarbons from the water they are produced in. Prometheus relies instead on a proprietary carbon nanotube membrane sieve that it says readily parts the hydrocarbons from water. “If they indeed have a low-energy separation process, that solves a big problem,” Yang says.

**Making fuel out of thin air**

At the heart of a new fuelmaking machine are pipes shot through with tiny carbon mesh tubes that filter fuel from water using little energy. The fuel comes from an electrochemical process that combines water (H2O) with carbon dioxide (CO2) from the air.
“Rob’s approach has a good chance of competing with fossil fuels,” says Matthew Eisaman, a physicist at the State University of New York in Stony Brook who consults for Prometheus. Eisaman ran a now-mothballed research program at Google’s research arm, Google X, that aimed to turn the CO2 in seawater into liquid fuels.

Bruce Hinds, a nanotube membrane expert at the University of Washington in Seattle, says McGinnis’s published results on his separation technology inspire confidence that the approach could work. “I’m highly encouraged,” Hinds says.

McGinnis has long defied expectations. After high school, he enlisted in the Navy, which sent him to Bahrain during the first Gulf War. There, he cleared mines from battlefields and harbors. “I didn’t want to do it,” he says of his time in the service, but he needed money for school. He enrolled in Cabrillo College, a public community college near Santa Cruz, California, where he dreamed up an energy-efficient approach to desalinating water during a chemistry class. Today, most water desalination uses reverse osmosis, which employs energy to push water through a membrane that excludes salts. McGinnis planned instead to use forward osmosis, which relies on differences in the concentration of compounds on either side of a membrane to move water across; it consumes only about half as much energy. “I prototyped it in my kitchen,” he says. “I wanted something to distinguish myself to [transfer] to a really good school.”

His school plan worked, and McGinnis moved to Yale University for his junior year. He majored in theater and focused on playwriting. “It was really good training,” he says. “A lot of what entrepreneurs do is tell stories.” But he never gave up on science. McGinnis canvassed the chemistry faculty to see whether anyone would let him use lab space in the evenings to pursue desalination. Menachem Elimelech, a Yale chemical engineer, agreed. McGinnis later pursued a Ph.D. in Elimelech’s lab, constructed a forward osmosis demonstration, and helped launch a startup company called Oasys Water in Cambridge, Massachusetts, to commercialize the technology. Oasys built five large water treatment plants in China and was eventually bought out by its customer there.

“It can sound like magic, but it’s really just chemistry.”

Rob McGinnis

Even before the buyout, McGinnis felt sidelined from decision-making. He left Oasys in 2012 to explore other ideas for improving membranes for separations, initially looking for even better ways to purify water. He chose to pursue membranes made from thin plastic sheets shot through with myriad carbon nanotubes—tiny hollow tubes made entirely from carbon atoms. Researchers at Lawrence Livermore National Laboratory in California and elsewhere had shown that the tiny channels allow water to pass through while blocking other molecules. But the lab demonstrations employed dime-size membranes; larger membranes leaked and weren’t uniform. “Carbon nanotube membranes never lived up to the hype,” says Jeffrey McCutcheon, a membrane separation expert at the University of Connecticut (UConn) in Storrs who collaborates with McGinnis.

McGinnis thought he could solve the problem. He formed a company called MatterShift and received lab space in a startup incubator at UConn. After 5 years, he could make uniform
membranes the size of a sheet of paper, consisting of carbon nanotubes embedded in a cheap commodity plastic called polyethersulfone.

The key, McGinnis says, was figuring out how to align vast numbers of nanotubes—roughly 2.5 trillion per square meter—so that most pierce the membrane perpendicularly, as ion channels on a cell surface do. Some researchers have speculated that magnetic fields are key to the process, but McGinnis isn’t saying. “It’s our secret sauce,” he says.

In March 2018, he, McCutcheon, and colleagues reported one possible use for their membranes in Science Advances: filtering out organic contaminants, such as odor-causing compounds, from water, while applying only a fraction of the pressure used to push water through reverse osmosis membranes. But McGinnis sees that use as a demonstration rather than his primary commercial target.

In the past year, he and his team have come up with a way to transform their membranes from flat sheets into narrow hollow plastic fibers dotted with nanotube pores. The researchers can manufacture those fibers in a continuous process, McGinnis says, cutting them to any length and bundling them to make industrial filters.

“The new piece in the puzzle”

The nanotube filters can perform a far more important feat than removing contaminants, McGinnis says: They separate ethanol from water. Carbon nanotubes of the right diameter—about 1 nanometer—transport ethanol more quickly than water through their interior. McGinnis explains that ethanol’s carbons have an affinity for the inside of the carbon nanotubes. So if the starting liquid contains at least 5% to 10% ethanol and a slight vacuum draws it through the filter, the alcohol molecules form a molecular conga line through the nanotubes, excluding nearly all water. The filtered solution winds up containing about 95% ethanol.

McGinnis and his team haven’t published those separation results yet. But researchers led by Yang Decai from Dalian University of Technology (DUT) in China reported in August 2018 in Nano Letters that a similar carbon nanotube membrane was highly selective and fast at separating ethanol and butanol (another alcohol) from water.

If commercialized, such membranes could benefit biofuel companies that make ethanol from corn, McGinnis and others say. Fermentation leaves a solution of 10% ethanol in water. Today, ethanol producers use heat and 6-meter-tall distillation columns to boil off the ethanol, an energy-intensive process that costs about a third as much as the alcohol itself. McGinnis says his membranes could cut the distillation cost by 90% in an ethanol market worth $50 billion per year in the United States.

If the membranes work as claimed, “That by itself would be big,” Peidong Yang says.

McGinnis is working to prove that they do. Last year, MatterShift and partners at UConn received a $900,000 grant from the Department of Energy to demonstrate their ethanol separation technology. Their test uses a 2-meter-high tube with 1400 nanotube-pocked fibers, with results expected this summer.

If either MatterShift’s or DUT’s membranes prove durable and long-lived, bioethanol producers should represent an eager market, says
David Sholl, a chemical engineer at the Georgia Institute of Technology in Atlanta. McGinnis has already founded a company called MatterShift Biofuels to commercialize the technology. But he envisions a bigger future for his membranes: not just filtering ethanol fermented from corn or sugar, but also purifying fuel made from the air itself.

Synthesizing the fuel is the easy part. Peidong Yang’s team and groups at Oak Ridge National Laboratory (ORNL) in Tennessee and the University of Illinois in Urbana have published papers in the past 3 years showing that electricity and nanosize copper catalysts can turn CO2 and water into a mix of alcohols. And startups including a New Orleans, Louisiana, company called ReactWell are pursuing related approaches.

Thus far, the ORNL team has reported the highest efficiency, turning 23% of the electrical energy into fuel. But all the groups using the approach to make alcohols face the challenge of separating the fuel from the water. McGinnis says his membranes are the answer. They are “the new piece in the puzzle no one else has.”

In the air-to-fuel machine he hoped to demonstrate at Y Combinator, the membranes filter a liquid that flows from a meter-wide chamber containing two electrodes dunked in water. When air blows through the chamber, the CO2 it contains reacts with water, producing carbonic acid—the same molecule acidifying the oceans. That acid, in turn, reacts on a copper catalyst coating the negative electrode, or cathode, to create CO. The cathode also strips protons off water molecules, leaving behind negatively charged hydroxide ions. Those ions travel to a positively charged electrode, or anode, where they react to form water and oxygen gas. Meanwhile, at the cathode, multiple CO molecules and protons are transformed into ethanol and other alcohols.

The result is the alcohol and water mixture that goes through the nanotube fibers. Prometheus has repaired its machine since the pitch fair, and it produces “a pretty steady drip” of fuel, McGinnis says: 10 milliliters per hour of alcohol that trickles out a red valve in the back. Over the next month, McGinnis and his colleagues plan to increase the size of their electrodes and catalysts to raise the production rate to 50 to 100 milliliters per hour.

Ultimately, McGinnis plans to add a second catalytic step using commercially available catalysts called zeolites, which would convert the mix of alcohols to the larger hydrocarbon molecules found in gasoline. “All of the pieces of this process have been proved to work. But no one has put them all together,” he says. “Until now.” He expects the device, when optimized, to produce 20 liters of gasoline per week.

Once the machine is working efficiently, electricity will make up about one-third of its operating costs. Renewable electricity prices around the globe are falling, however, and they already sink near zero at certain times of the day in places where the sun blazes or the wind howls. Prometheus, McGinnis says, could easily ramp its electricity demands up and down to take advantage of the lowest rates, and the machines could be sited wherever renewable power is cheapest. Next year, the company plans to build a $500,000 shipping container–size demonstration plant that can produce hundreds of thousands of liters of fuel per year. And last month, it inked its first deal, to begin to sell carbon-neutral fuel to Boom Supersonic, a Denver company building a supersonic commercial airliner.
Even if all goes according to plan, McGinnis will face a long road to compete with the likes of ExxonMobil. He'll have to prove he can build a fuelmaker cheaply enough to make its gasoline affordable. That could be tough if turning it on makes sense only when renewable electricity prices bottom out. The fuelmaker also works only with a source of clean water. And before he can market his invention, he'll need to prove that his fuels can directly substitute for fossil-derived versions.

At the pitch fair, McGinnis stands next to his prototype and repeats his story for a steady stream of potential investors. “We want to replace all fossil gasoline,” he says. “That would make the world a better place.” A few hours later, he loads up his wares and moves on in the hope that one day his dreams turn into an energy revolution.

UCONN RESEARCHERS TACKLE WHICH CHEMO TREATMENT IS BEST FOR CANCER PATIENTS

When it comes to cancer, trying to figure out at the onset which chemotherapy works best for the patient, can be challenging.

By Jocelyn Maminta

FARMINGTON, Conn. (WTNH) – When it comes to cancer, trying to figure out at the onset which chemotherapy works best for the patient, can be challenging.

“When we heard about this challenge in chemotherapy and the way cancer patients are treated, we used our background and knowledge of biomedical engineering, bio-materials, tissue engineering to create this platform to help save lives,” says UConn Engineering PhD student Lela Daneshmandi.

Fellow UConn Engineering PhD student Armin Rad and Daneshmandi say saving lives can come down to precious time.
Rad says, “If the drug is not working, which in a lot of cases it doesn’t, the tumor is progressing and the patient is under a lot of unnecessary pain.”

Genetics play a role.

“The main problem in cancer therapy,” says Rad, “is coming from the variation among the people. People are different in terms of the type of genetics they have, the type of mutation that happens inside the tumor.

So to help cancer specialists make the best decision at the beginning of the process — they’ve come up with technology to determine the most effective treatment.

The process begins with a doctor sending in a patient’s tumor cells, which are then grown and tested for different types of treatments.

“Our earlier studies showed that there really is a difference between the different drugs that a cancer cell is exposed to and even different doses may affect it. We can modulate the dose, the type of cancer, we an even use a combination of different drugs to see if that can potentially kill highly aggressive forms of cancer.”

— LELA DANESHMANDI, ENGINEERING PHD STUDENT AT UCONN

They’ve teamed up with oncologist Dr. Omar Ibrahim at U-Conn Health for the clinical testing phase.

The focus is on lung cancer.

“The sooner we can start treating, lung cancer in particular, but all cancers in general, a patient’s prognosis improves,” says Dr. Ibrahim, emphasizing what’s being done here could be a game changer.

He explains, “Now we’re not guessing or assuming the medication will work. Now we’ll know the medication will work.”

They’ve named the company “Encapsulate.”

The technology should hit the market in two to three years.
Cabot Corporation had a mystery to solve: the global chemical and performance materials company was making carbon black for high-performance batteries, but finding the substance was ever-so-slightly contaminated. Since contaminants can decrease the performance and shorten the lifetime of batteries, this was a mystery in need of an urgent solution. Now, thanks to a collaboration between the company, UConn researchers, and ZEISS Microscopy, Cabot has a better idea of what the contaminants are and where they might be coming from—and the researchers developed a new way to map a material by combining four different kinds of microscopes.

“It’s a classic problem in microscopy: finding a needle in a haystack,” says UConn engineer and director of the Reverse Engineering Fabrication, Inspection and Non-destructive Analysis (REFINE) lab Sina Shahbazmohamadi. Although finding something microscopic with a microscope might seem easy, it’s actually very difficult. The finer your point of view, the vaster the territory.

“Carbon black is a low density powder. Five grams is a lot of material, volume-wise. And in five grams we are searching for contaminant particles that are five to ten micrograms across,” says engineering PhD candidate Abhinav Poozhikunnath, who lead the research. Finding them wouldn’t be easy. The classic method would be to burn the material to reduce the volume and then sift through it. But burning destroys any clues that could hint at how the carbon black was getting contaminated, and could also alter the contaminant itself.

Instead, Poozhikunnath decided to use a series of microscopes to narrow down the location of the contaminants and eventually find them directly. He worked with Shahbazmohamadi in the REFINE lab, which has state-of-the-art microscopes of each type and close connections with ZEISS Microscopy, which also collaborated on the work.

First, Poozhikunnath embedded the carbon black (which resembles black dust or soot) in epoxy to fix it in place so that it could be mapped. Then he scanned it with x-rays to create a 3D map, the same way a CT scan maps the human body. He knew the contaminants were metals, and probably a lot heavier than the carbon. That meant the x-rays would bounce off them, making bright spots in the map. And that’s just what happened.

Poozhikunnath then used a pulsed laser to remove larger lumps of epoxy and
carbon black, followed by a Focused Ion Beam (FIB) microscope to finely cut away at the lump of epoxy and carbon black until it exposed a contaminant. The FIB shoots gallium ions at the sample. Each atom of gallium chips away a tiny bit of the epoxy or carbon black. It’s like a very, very fine chisel.

Once the contaminant was exposed, Poozhikunath took a picture of it and its surroundings with a Scanning Electron Microscope (SEM). SEMs can take beautiful visual images of microscopic surfaces, and can also reveal other things about the properties of what’s being imaged, depending on how the electrons interact with the surface.

He then used Energy Dispersive X-ray Spectroscopy (EDS) to analyze the contaminants and the carbon black particles surrounding them.

Using a computer program called Atlas, developed with the help of researchers at ZEISS, Poozhikunath and Shahbazmohamadi were able to have the different microscopes “talk” to each other. With Atlas, the x-ray CT scan could tell the FIB and SEM exactly where to look to find the contaminants with respect to a fixed point on the sample. This allowed the FIB and SEM to avoid instead scanning the entire lump (which would have been almost impossible, or at least take far too long.)

“This ability to communicate between different instruments is a key technological development that allowed us to succeed,” says Poozhikunath.

In Cabot’s carbon black, some of the contaminant turned out to be flecks of iron oxide. But the same technique could be used to solve many similar problems faced by all kinds of industries. It could also be automated and used for quality control purposes in the semiconductor industry, Sina says.

The researchers are currently working with ZEISS to see if they can completely automate the process, with the data from each microscope flowing into Atlas and helping to guide the next microscope’s investigation. They’re also exploring ways they might use this to train automated systems to find contaminants via machine learning algorithms.

Automating the process so microscopes can talk to each other and solve a real industrial problem is a valuable result, the researchers say. As was the way the researchers first learned about it: Cabot reached out to UConn VP for Research Radenka Maric, who has expertise in battery and fuel cell materials. Maric, in turn, told researchers in the Institute for Material Sciences about the problem, which is how Poozhikunnath and Shabazmohamadi got on the case.

As Shahbazmohamadi says, “Not only instruments should talk to each other; faculty should talk to each other, too!”
College of Liberal Arts and Sciences
Dr. Nicole Christian-Brathwaite has seen a string of children of color at her Newton clinic in recent months with symptoms of anxiety: insomnia, hypervigilance, a fear that they are not safe at home or that when they return from school, a parent will have disappeared.

When she presses for more details, the psychiatrist often hears a list of racial terrors, both local and national: swastikas found in the bathroom at school, racist threats against classmates, President Trump’s just last week presiding over a crowd of mostly white supporters in Greenville, N.C., chanting “send her back! send her back!” about Representative Ilhan Omar of Minnesota.

“I’ve rarely had anyone come and say, ‘I’m stressed because of racism,’ ” Christian-Brathwaite said. Instead, kids tell her, “I can’t sleep. My grades are dropping,” and when she hears their specific concerns, she understands that racism is one of the triggers.

As a black woman, she feels the strain, too.

“I haven’t watched the news for a number of days because I’ve found it really, really stressful,” she said. “Some nights I find that I can’t sleep. Some days I have a headache and I can’t explain why.”

As Trump doubles down on attacks against the four women of color in Congress known as “The Squad,” which includes Omar and Representative Ayanna Pressley of Massachusetts, some people of color in the Boston area describe a psychological toll that the episodes, and Trump’s frequent overt hostility, have had on their daily lives — not just this month, but in the many months since the 2016 presidential campaign began.

Some have tried to guard themselves against the everyday tumult coming from the White House; others have become more vocal in politics. Some have found a grim silver lining, because the scourge of racism that some white people recently claimed had disappeared is now impossible to ignore or explain away. Many said it reminds them of other dark moments of personal and national history, when racial hostility and tension reared up.

“Some of it feels very familiar, and it just looks like another head of the same
“beast,” said Sharon Hinton, a 64-year-old former teacher. She said she has felt constantly under stress, with the urge to “go undercover” and not draw attention to herself.

A large body of research backs up her experience.

“We have now 20 years of research that connects racism with just about every mental health issue that has been studied,” said Monnica Williams, a professor and the director of the laboratory for Culture and Mental Health Disparities at the University of Connecticut. The effect of “vicarious racism” — seeing, for example, videos of police shootings of unarmed black men, or hearing chants of “Send her back!” — has not been studied as much, according to Jessica Graham-LoPresti, an assistant professor of psychology at Suffolk University, but social media indicates the experience is certainly on the rise.

“People are being not only exposed to their own experiences of racism, but they’re being vicariously exposed to everyone’s experience of racism,” she said, adding that patients often exhibit symptoms very similar to those from post-traumatic stress disorder, as well as depression and social anxiety.

Finding individual solutions to a systemic problem can be daunting. One of the most useful tools that psychologists suggest is simply acknowledging the truth of what patients are seeing and feeling.

“The first piece of what I do with anyone who comes to my office is really validate them and say, ‘This is real,’ ” Graham-LoPresti said of her work as a practicing psychologist. “It’s reasonable to be having a mental health response.”

When Trump attacked the congresswomen on Twitter, asking “Why don’t they go back” to their countries (they are all American citizens), it was just the latest in what people of color say has felt like a relentless barrage of hostility from the White House: the threat of national ICE raids targeting migrant families; reports of squalid camps at the border where migrant families are detained; the president’s reported use of an expletive to refer to certain countries like Haiti, El Salvador, and some nations in Africa; his remark that there were “very fine people on both sides” of a white supremacist rally in Charlottesville, Va.; the executive action banning travel from several predominantly Muslim countries; and before his election, Trump’s personal attacks against a federal judge because of his Mexican heritage.

Katherine Hernandez, a member of the Service Employees International Union local 32BJ, said when she first learned Donald Trump had won the election, she cried.

Katherine Hernandez, a security officer in Boston and a member of the Service Employees International Union local 32BJ, said when she first learned that Trump had won the election, she cried. Hernandez came to the United States from the Dominican Republic when she was 15 and said she sometimes encountered people in those early years who didn’t think she belonged. They would tell her to “go back” to her country, just as Trump did to the congresswomen this month.

But faced with a hostile president, Hernandez said, she has been motivated to fight more vocally for immigrants, becoming active in her union and educating her co-workers about immigration.
“Right now, it’s all about knowing your rights,” she said.

Perhaps what has been most heartbreaking to some people of color is not that Trump’s words and actions are new, but instead precisely that they are old, part of what some thought was a bygone era of overt racism.

“There was a kind of illusion: We not only said we were post-racist, we said we were post-racial. Much of that was engendered by the election of the first black [president] in American history,” said the Rev. Ray Hammond of the Bethel A.M.E. Church in Jamaica Plain. “At this point that is all gone.”

He sees a positive side to the dissolution of that collective state of denial, though. Now that the truth is out in the open, “we know what the work is that needs to be done.”

For some people of color, the Trump era has produced a reckoning not so much for them but for some of their white neighbors, who denied anything was wrong.

“I think it’s good in the sense that a lot of white folks didn’t believe me when I said I faced racism, and now they believe me,” said Christopher Huang, an Asian-American photographer and activist.

Some said it was not just about what Trump says or does in 2019, but also about what he dredges up from the past. Sara Orozco, 56, has been remembering being bullied in her Cuban neighborhood in Miami, where white people from the surrounding streets would drive by in their cars, swinging bats at their mailboxes screaming, “Go home, spics!” Frantz Paillant Jr., 37, whose family is from Haiti, recalls the terrifying rumors that would run through Mattapan when he was a child that immigration officers were planning to show up to the local grocery store and round up undocumented people. Jason Johnson, 51, has been remembering visiting a used furniture store in Dallas after college, and finding the store owner waiting for him with his hand on a gun.

“You live a life kind of experiencing those things, and you can’t be shocked,” said Johnson, who is black.

Even if Trump’s words and actions are not shocking to many people of color, they have still left their marks.

Rev. Jeffrey Brown says his children will inherit a world that doesn’t seem much improved from the one he grew up in.

The Rev. Jeffrey Brown, an associate pastor of Twelfth Baptist Church and a longtime racial justice activist, said he is frustrated that his own children have to inherit a world that doesn’t seem much improved from the one he grew up in.

“They are experiencing things that I heard about and read about my parents’ going through in the time of segregation,” he said.

Aisha Veras, a 17-year-old Hispanic woman who is entering her senior year of high school, echoed Brown’s sentiments. She said she was once naive about the long history of racism in this country, but is no longer.

“It sucks to know that your grandparents could have probably gone through the same thing that you’re going through now,” she said.
DONALD TRUMP IS STRESSING OUT AMERICA

Why the economy doesn’t help the president as much as he thinks.

By Daniel W. Drezner

Political Science 101 says that Donald Trump should be running on the economy for 2020. Political Science 201 says matters are not that simple. The stress of being an American under Trump is getting worse.

The economy is doing pretty well. Economic growth is a shade under 3 percent, unemployment is well below 4 percent, and inflation is below 2 percent. These are great top-line numbers, thanks to the Trump administration’s unwitting discovery of Keynesianism.

These numbers do not tell the whole story, however. The New York Times’ Jonathan Martin and Maggie Haberman note that while voters give Trump decent marks on the economy, there’s a soft underbelly to those numbers: “most workers are still gaining less under Mr. Trump than they did during previous times of low unemployment, such as the late 1990s, and fewer than two in five respondents to a SurveyMonkey poll for The New York Times this month said their family was better off financially today than a year ago.”

If the economy is doing well but average Americans aren’t feeling it, that is bad news for Trump. And looking beyond the economy, there is an awful lot of evidence suggesting that Americans are not feeling too well. The polling data is one obvious metric. According to Gallup, in 2018, more Americans were stressed, worried and angry than at any point in the last 12 years. That is extraordinary when you consider that the past dozen years includes the 2008 financial crisis and multiple terrorist attacks. Furthermore, American stress levels are among the highest in the world. Seriously, Americans were as stressed as Iranians and more stressed than citizens of Rwanda, Turkey, and Venezuela. That’s nuts.

Does Trump have anything to do with this? It is difficult to determine causality, but the data is pretty suggestive. Trump inspires a whole host of negative reactions in most Americans. Pew polled Americans in the spring and asked them to describe how Trump’s comments and statements made them feel. The top seven responses, in order: concerned (76 percent), confused (70 percent), embarrassed (69 percent), exhausted (67 percent), angry (65 percent), insulted (62 percent) and frightened (56 percent). I am not a psychologist, but I would reckon that there might be something going on here. If these are the dominant emotions that Trump elicits, and if Trump is everywhere, then hey, it’s going to stress a lot of Americans!
Even more concrete evidence has come to light in the past week. As my Post colleagues William Wan and Lindsey Bever reported recently, “Researchers have begun to identify correlations between Trump’s election and worsening cardiovascular health, sleep problems, anxiety and stress, especially among Latinos in the United States.” One disturbing JAMA study looked at premature births, an easily quantifiable metric of stress during pregnancy. After analyzing approximately 33 million births between 2009 and 2017 researchers found 3 percent more preterm births than expected among Latina women in the nine months after the election.

It’s not just Latina women who are feeling the stress of America under Trump. The Boston Globe’s Zoe Greenberg reports that psychologists are having to treat a number of anxiety-related maladies among minority clients, including insomnia and hypervigilance. When they dig deeper, the underlying cause becomes apparent:

As Trump doubles down on attacks against the four women of color in Congress known as “The Squad,” which includes Omar and Representative Ayanna Pressley of Massachusetts, some people of color in the Boston area describe a psychological toll that the episodes, and Trump’s frequent overt hostility, have had on their daily lives — not just this month, but in the many months since the 2016 presidential campaign began.

Some have tried to guard themselves against the everyday tumult coming from the White House; others have become more vocal in politics. Some have found a grim silver lining, because the scourge of racism that some white people recently claimed had disappeared is now impossible to ignore or explain away. Many said it reminds them of other dark moments of personal and national history, when racial hostility and tension reared up...

“We have now 20 years of research that connects racism with just about every mental health issue that has been studied,” said Monnica Williams, a professor and the director of the laboratory for Culture and Mental Health Disparities at the University of Connecticut. The effect of “vicarious racism” — seeing, for example, videos of police shootings of unarmed black men, or hearing chants of “Send her back!” — has not been studied as much, according to Jessica Graham-LoPresti, an assistant professor of psychology at Suffolk University, but social media indicates the experience is certainly on the rise.

“People are being now not only exposed to their own experiences of racism, but they’re being vicariously exposed to everyone’s experience of racism,” she said, adding that patients often exhibit symptoms very similar to those from post-traumatic stress disorder, as well as depression and social anxiety.

There are a lot of drivers of stress. A robust economy should lessen a primary driver. But the data is pretty clear. The U.S. economy is not benefiting as many citizens as one would expect. More significantly, Trump’s racial divisiveness and bellicose rhetoric are stressing out an awful lot of Americans.

There are multiple ways to help alleviate this national anxiety. More social capital will be needed. More balanced economic growth would be nice. It is becoming increasingly clear, however, that the best palliative care for U.S. stress levels will be to make sure Donald Trump exits the White House as expeditiously as possible. ●
“Live-tweeting has potential pitfalls on audience experience,” reports a new University of Connecticut study which monitored the experiences of those who watched one screen while tapping feverishly on another.

That is a lot of people. More than half of television viewers ages 18 to 24 — a coveted TV audience — use a second, web-connected device for engaging on social media to chat about what they are watching. The practice has an impact.

“Toggling between viewing entertainment and social media lessens a person’s ability to escape reality and enjoy a show,” said the study, conducted by the university’s Department of Communication and published in the Journal of Broadcasting & Electronic Media, an academic source.

The most significant impact of the two-screen experience was on viewers’ ability to “transport” into the narrative and become immersed in the televised story, they found.

“Despite its popularity, live-tweeting has potential pitfalls on audience experience,” said Saraswathi Bellur, assistant professor in communication, who led the research.

It compared the experience of 230 young viewers; half live-tweeted a showing of the classic sitcom “Friends” — and half did not.

“Compared to those engaged in media multitasking, participants consuming only one medium were more likely to experience ‘transportation’ into the content and, in turn, more intensified emotions,” the study said.

“Given the prevalence of television shows that actively initiate social media conversations among viewers by promoting conversations, more research needs to be done,” the authors concluded. •
For nearly three decades, researchers including archaeologists, historians and DNA experts have been investigating the identity of a Connecticut vampire.

And now they have new information, a name: John Barber.

Barber’s newly-discovered identity helps answer lingering questions about the mysterious case of a man who died of tuberculosis in the early 1800s and was uncovered more than a century-and-a-half later as a mutilated corpse.

History suggests Barber’s family or neighbors suspected he had become a vampire in death. Their efforts to kill John Barber, the vampire, set in motion a mystery that would span generations.

Nick Bellantoni, emeritus Connecticut state archaeologist and anthropology professor at the University of Connecticut, told USA TODAY that he has been on this case since the “vampire” was found in 1990.

“Some kids were playing at a gravel bank in Griswold, Connecticut,” said Bellantoni. “During one of their slides down, two skulls dislodged and rolled down the hill with the boys.”

When one of the boys brought a skull to his mother, she called the police.

That call began an investigation into a colonial-era cemetery that seemed to be the final resting place for generations of two families over the years, according to Bellantoni.

Fans are confused: Macy Gray talks recent hospitalization and calls herself a ‘vampire’

After ‘vampire facial’: 2 people infected with HIV

But there was something different in one of the coffins.

A skeleton was decapitated. His bones were rearranged into a skull and crossbones, Jolly Roger style.

The mutilation likely happened four or five years after the man — known as JB55 for the initials and age found on his coffin — had died, Bellantoni said.
At the time of Barber’s death in the early 1800s, people believed that the dead would rise up and infect family members. He died from tuberculosis, or consumption, according to the lesions on his ribs, Bellantoni said.

“Vampirism was a way to explain the unexplainable in an age before modern medicine existed,” Charla Marshall, lead scientist on the DNA exploration, told USA TODAY in an email. “The vampire scare was real in New England in the 1800s.”

In a moment of fear during the “Great New England Vampire Panic,” families were digging up their deceased relatives to ensure they couldn't spread diseases, according to the Smithsonian.

Tuberculosis was one of those illnesses.

Tuberculosis victims could remain asymptomatic for years and fall ill much later, strengthening the theory that a dead relative could have come back to infect others posthumously.

Vampires were thought to have a pale complexion and protruding teeth, according to folklore.

Akin to that imagery, the sickness gave its victims a very haggard look. With bulging eyes and sunken cheeks, victims became very pale and coughed up blood. Their gum lines would recede, too.

The practice of digging up bodies wasn’t uncommon across New England, and in other regions such as Europe throughout the world.

Sometimes, it was a family-only event, voted on by town leaders or it was a public affair. In places such as Vermont, it could even be festive, according to Smithsonian.

When JB55 was discovered, information about the corpse was scarce.

Bellantoni said they looked at historical records to learn more. His research team was able to find out a bit about the Waltons, the family that lived in that area before JB55 and his relatives. But information about the B family themselves was lacking.

Decades after he was discovered, scientists at the Armed Forces DNA Identification Laboratory in Delaware were able to use JB55’s DNA to find a name.

Their findings were debuted at a presentation at National Museum of Health and Medicine on July 23. They have submitted a paper on their work to the peer-reviewed journal, Genes.

Marshall said they used a forensic test to look at a DNA profile of the Y chromosome.

Family surnames, like the Y chromosome, are passed down from father to son. So matching Y chromosomes can be used to predict a surname, Marshall said.

When they searched a public database, they found two individuals with the last name “Barber” who were exact matches to JB55’s profile.

Once they had a last name, they used public records from the state to search for J Barber in Griswold.

“We came up a newspaper item from 1826 describing the death of Nathan Barber, son of John Barber,” she said.
Nathan Barber, NB, was also buried in the cemetery.

It wasn’t a too big a task to find Barber’s name, Marshall said. The team treated it as a side project, chipping away when they had time. They started searching in 2018.

They don’t know who the descendants of John Barber are. But, Marshall said, they hope that his relatives will come forward after their full report is published.

“It’s been 30 years almost, so it’s nice to get some closure,” said Bellantoni. “On the other hand, vampires never die so I suspect I’ll be telling this story forever.”

EL PASO, RACISM AND RHETORIC: THE GROWING TOLL OF BIGOTRY IN AMERICA

For some Americans who are members of minority groups, the intersection of hate and violence has become a looming source of fear.

By Janell Ross and Suzanne Gamboa

EL PASO, Texas — Olivia Ortega is not sure she’ll continue speaking Spanish with her three bilingual kids in public places in West Texas, after a gunman targeting “Mexicans” opened fire in an El Paso Walmart earlier this month.

In upstate New York, children living in a black Muslim enclave play an adaptation of tag. The name of a would-be anti-Muslim bomber, Robert Doggart, who was arrested in 2015 for plotting to destroy their community, serves as “it.”

And, at a Fort Worth, Texas, church that holds Sunday services in Korean, Burmese, Swahili, Spanish and other languages, the Rev. Will Aplicano has

This article was published on August 15, 2019.
recently fielded calls from immigrants asking if it’s safe for them to gather together to pray.

For some Americans who are members of racial, ethnic and religious minority groups — long the targets of President Donald Trump’s rotating ire — the way that hate and violence can combine has moved from the realm of historical knowledge to known risk to, now, looming fear.

Immigrants, Muslims and people of color who spoke to NBC News say they’ve watched with growing alarm as racist rhetoric has become more commonplace, both on the internet and in their communities, leading to a rise in hate crimes three years in a row and a drop in their sense of security.

For some, catastrophic events like the El Paso shooting, which left 22 people dead, jolted them into the realities of America in 2019.

For others, particularly many racial, ethnic and religious minorities, it marked a sickening extension of the big and small insults, threats and injustices long a part of American life, even in a country that promises equality for all.

It’s that combination, what’s happening now and all that’s long happened, that raises the risk of debilitating trauma for those exposed to persistent reasons to fear, experts say.

“When we think about trauma, often we think about individual incidents — someone being raped or seeing combat — but in fact, trauma is cumulative,” said Monnica Williams, a psychologist who has researched the impact of racism on mental health at the University of Connecticut and developed the concept of racial trauma-induced post-traumatic stress disorder and the tests used by some clinicians to diagnose it.

“So the more traumatic events to which you have been exposed, the more likely to experience PTSD.”

Racism’s physical, emotional and financial toll can be so devastating that the American Academy of Pediatrics issued its first policy statement this week on its effect on the health of the nation’s children.

While long in the works, the warning of racism’s impact and recommendations for how doctors should respond seems particularly necessary now given the “cultural climate” and recent events, Dr. Jacqueline Dougé, a pediatrician who co-wrote the policy, said.

“Racism is not a new thing or a simple thing,” Dougé said. “It’s obviously incredibly complex but presenting differently at present.”

Almost six months before the gunman walked into that El Paso Walmart, surveyors with the Pew Research Center found that a substantial share of Americans said they have feared for their personal safety because of their race or ethnicity. About 43 percent of black respondents agreed, as did 30 percent of Latinos and 38 percent of white Americans.

Pew researchers did not ask additional questions to probe the reasons behind those safety concerns. But consider 2019.

In January, Oregon’s attorney general announced efforts to curb a 40 percent increase in hate crimes in the state, and Los Angeles reported the largest number of hate crimes in a decade. The following month, someone
smashed the windows of a Brooklyn synagogue.

By April, a man opened fire in a California synagogue, killing one person and injuring three others. In May, a drone dropped leaflets over Sacramento bearing swastikas and referring to the press as the “enemy,” an idea repeatedly expressed by the president. The following month, armed neo-Nazis disrupted gay pride events.

And, last week, as grieving families held funerals for the El Paso mass shooting victims, police arrested a white man in Florida who authorities said appears to espouse white supremacist ideas online and who was accused of posting on social media, “3 more days of probation left then I get my AR-15 back. Don’t go to Walmart next week.”

Madihha Ahussain, special counsel for anti-Muslim bigotry at Muslim Advocates, a national civil rights group, is among those who see a link between the president’s commentary, his policies and rising, if underreported, hate crimes. Trump has often referred to undocumented immigration as a type of “invasion,” the same word police say the El Paso gunman used in an anti-Hispanic screed posted online. And, as a New York Times analysis of Fox News broadcasts found, multiple administration officials and political allies of the president have used similar language repeatedly on that network.

“Yes, we have had hate crimes in the past,” said Ahussain, who fields calls from people afraid to report possible hate crimes and discrimination to authorities. “But now we have individuals in high office using the very same language and ideas and justifications as the people committing these crimes.”

Ortega, the El Paso mother, said all this has kept her on edge.

She didn’t appreciate Trump’s false running commentary on lawlessness in El Paso, her hometown, during and after the 2016 election.

Before the shooting, El Paso was actually one of the safest cities in the country.

It’s a city that’s more than 80 percent Latino, where cross-border interactions are common, and which at times could feel like a bubble, insulated from the ethnocentrism sweeping the country. But the Walmart shooting, immediately followed by the arrests of hundreds of people in Mississippi immigration raids, has raised Ortega’s concerns about Trump’s rhetoric to the level of fear.

In particular, Ortega worries about her youngest daughter, 3, who arrived in the world with skin that’s a bit darker than her siblings, who are 9 and 7.

Ortega has wondered if the girls’ skin could attract the attention of federal agents (who legally can set up checkpoints within 100 miles of the border). In Ortega’s post-shooting nightmare scenario, her daughter, an American citizen, could wind up wrongly separated from the family, on the other side of a Trump border wall, if Ortega can’t immediately produce the child’s birth certificate.

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“I’m getting scared something will happen to them,” Ortega said of her children, “about the way they talk, the way they look, the color of their skin.”

At the University of Connecticut, Williams and her colleagues have treated what she describes as a growing number of people of color who have endured the
daily indignities of co-workers bristling at their ideas and business owners questioning their presence in ways that seem to mirror Trump’s assaults on the intelligence and belonging of any person of color who questions him.

Williams, who is set to begin new research soon at the University of Ottawa in Canada, has also recently heard more stories from people who describe what felt to them like dangerous encounters with police, neighbors and strangers who seem emboldened to say offensive things.

The people with PTSD whom Williams has treated are often hypervigilant, meaning they may be jumpy when tapped on the shoulder from behind, or obsess about possibilities that seem unlikely to others. And they experience physical symptoms, including high blood pressure and insomnia.

“The idea of racial trauma, mass, wide-scale racial trauma, not only should not be dismissed,” Williams said, “but the impulse to do so ultimately reveals something about anyone inclined to do so quickly.”

Among young adults, the onslaught of horrible racial news headlines can drive a sense of despair, said the Rev. Kevin Cosby, the president of Simmons College of Kentucky, a historically black university, and the pastor of St. Stephen Church, a predominantly black congregation in Louisville.

“I think there are a lot of young people, in particular, millennials who are struggling with the reality that this is what our country has always been and always will be absent some sort of reset,” said Cosby, who co-founded the Angela Project, an effort to connect black and white Christians, four years ago.

“And I think many of them feel both vulnerable — emotionally and economically — and guilty about what injustices are occurring in our names, right now.”

At Fort Worth’s Bethesda Community Church — where Sunday services are held in six languages in addition to English — news of the El Paso shooting stirred a lot of fear among refugee and immigrant congregants, Aplicano, the pastor who leads the church’s language ministries, said.

“There were people who asked, can we go out on the street?” Aplicano, who immigrated to the United States from Honduras, said. “Is it safe? Should we come to church on Sunday? Is gathering a good idea? Some of them were saying, you know, right now I think it’s better if I stay home. Should I go to Walmart? The answers here, again, aren’t easy. We can’t pretend that evil does not exist ... but you cannot stop living. You cannot surrender to fear.”

Aplicano’s congregants are not alone in their safety concerns. In fiscal year 2015, 715 nonprofit organizations applied for Department of Homeland Security grants for groups at “high risk” of an attack. Most were religious institutions in need of help making their facilities more secure. In fiscal year 2019, 2,037 organizations applied, the agency told NBC News.

Black Americans and Muslim Americans have long ranked among the most frequent victims of hate crimes.

Both realities do not have to be explained to Tahirah Amatul-Wadud. She’s one of two lawyers who represent a community of about 200 people called Islamberg, about 45 minutes west of Binghamton, New York. Several of
Amatul-Wadud’s siblings, nieces and nephews also live in the community, founded by black Muslim families four decades ago when several decided to leave Brooklyn.

The community has been the target of multiple plots, including by Doggart, who was recorded by the FBI as saying, “I don’t want to have to kill children, but there’s always collateral damage.” The most recent threat came this year, when a group of white teens from a nearby town were found with homemade explosives and a plan to destroy Islamberg.

“The abnormal has become so normal, so much a part of life,” Amatul-Wadud said.

In the years since Doggart’s arrest, residents have formed a neighborhood watch to monitor the community’s entrance. Women in Islamberg have committed to a buddy system that means never leaving the property alone.

And while most continue to wear hijabs, few wear the colorful ankle-length abayas that had been customary off the property.

“Nothing about our lives has, since 2015, been easy,” Amatul-Wadud said. “It’s not an easy decision, muting who you are, trying to be less easily identifiable and hoping that will provide safety.”
A Latino baby born on Long Island today can expect to live until about age 87 on average, according to new research. White, non-Hispanic Long Islanders are likely to make it until 81, African Americans to 80.

That significantly longer Hispanic life expectancy may have its roots in places like Dulce Nombre de María, El Salvador, the birthplace of West Islip resident Ana Cruz. There, families tend to be close, residents often get around on foot and bicycle instead of by car, and people typically eat more fresh fruits and vegetables, she said. There are no American-style fast-food restaurants.

“My mother always cooked at home,” Cruz, 30, said in Spanish. “We never went out to eat.”

Researchers are still studying why Hispanics nationally and on Long Island live longer than whites, and have lower rates of cancer and heart disease, even though they have lower median incomes and educational levels, and are more likely to be uninsured — factors that usually lead to shorter lives.

The life expectancy numbers are compiled from National Center for Health Statistics data by the University of Wisconsin Population Health Institute and the Robert Wood Johnson Foundation. The analysis does not include Asian life expectancy.

Experts believe the Hispanic life expectancy has something to do with immigration. Immigrants in other Western countries also are healthier than native-born residents, research has found. They also link it to how Latinos often have closer family ties — within both their immediate and extended families — and stronger community and neighborhood relationships.

“Strong families and support systems are related to good mental health, and that is associated with good physical health and longevity,” said Kyriakos Markides, a professor of aging at the University of Texas Medical Branch at Galveston who has been researching the topic for decades.

David Hayes-Bautista, director of the Center for the Study of Latino Health and Culture at UCLA, said, “Clearly the community, the civil society as a whole, has a huge impact on health care,” but most research on the life expectancy
differences focuses on individuals.

More research on how social and family networks impact life expectancy also could answer the question as to “why do people not do so well?” he said. “What is lacking in their community?”

A study published in April that found Latina mothers laughed more often than white, non-Hispanic mothers is another indicator of the Latino health advantage, said Nairán Ramírez-Esparza, lead author of the study and an associate professor of psychological sciences at the University of Connecticut. The study was published in *PLOS One*, an open-access, peer-reviewed journal.

With Latinos more likely to be close to family members, and with socialization in general a more important value in Latino culture, they are more likely to have “conversations of quality,” she said. “That leads them to laugh more. If they laugh more, we can assume that that laughter will be a factor for their health.”

Diet and exercise also appear to be factors, which could explain why immigrants who have lived in the United States for 20 years tend not to be as healthy as immigrants who arrived more recently, Markides said.

Studies also show that the “mortality advantage” — lower age-adjusted death rates — is greater for Latin American immigrants than for their children and grandchildren.

“Children who grow up in this country become like other children around them,” Markides said. “They eat junk food.”

Ana Cruz’s husband of nine years, Miguel Bonilla, 37, said he has a less healthy diet since he arrived in the United States from El Salvador in 1999, and he’s gained a lot of weight. During the workday, he often picks up unhealthy meals from delis.

“It’s hard when you have two jobs and you don’t have time to stop for an hour to eat properly,” said Bonilla, who owns and drives for a car service, and co-owns a fencing company. “You have to eat on the run.”

In addition, people in his hometown in El Salvador walk and cycle a lot more than people here, he said. His father, who lives in El Salvador, has a car, but he usually prefers to get around by bicycle. Bonilla said that when he goes to a store two blocks away in West Islip, “I get in the car.”

Bonilla believes one reason Latin American immigrants have higher life expectancies is because many have jobs in fields such as landscaping and construction — he was a construction worker before he became a business owner — that require physical exertion.

But “you want your children to be better than you,” said Bonilla, who, along with Cruz, is a legal, permanent U.S. resident. “You don’t want them to hustle the way you did. You don’t encourage them to work in construction or landscaping and all those industries.”

One key reason for the Latino mortality advantage is lower rates of smoking, said Elizabeth Arias, a demographer for the National Center for Health Statistics who researches mortality rates, including by ethnicity.

Arias was co-author of a July report from the center that showed a steady decrease in age-adjusted death rates for Latinos between 2000 and 2017. Life expectancy estimates are based on death rates, which are calculated
every year.

Yet there are signs the Latino mortality advantage may decline, said Noreen Goldman, a professor of demography and public affairs at Princeton University who authored a 2016 study on the topic that was published in the journal Research in Aging.

High diabetes rates among Latinos and growing obesity rates may decrease the gap between Latino and white mortality rates, she said.

In addition, declining immigration from Latin America will have an effect, because of the higher life expectancy of Latino immigrants compared with U.S.-born Latinos, she said.

Markides believes immigration, rather than Latin American ancestry, is the main reason for the health gap between Latinos and non-Hispanic whites.

He has studied immigrant communities in Canada, Australia and Europe and found that, as in the United States, immigrants in general tend to be healthier.

One reason likely is that people who leave their homelands tend to be healthier than those who stay behind, Markides said.

Today, there are more people immigrating to the United States from Asia than from Latin America.

Arias is researching Asian life expectancy and mortality rates. Data isn’t final, but she is finding higher life expectancy for Asians than for whites.

### LIFE EXPECTANCY

**Latinos on Long Island live on average several years longer than white, non-Hispanic and black residents.**

**NASSAU COUNTY**

- Hispanic/Latino: 88.6 years
- White, non-Hispanic: 82.2
- Black: 81.6

**SUFFOLK COUNTY**

- Hispanic/Latino: 86.8 years
- White, non-Hispanic: 80.3
- Black: 78.4

UCONN STUDY FINDS THAT TRASH TALK LEADS TO ANGER, SHAME, POOR PERFORMANCE

By Alex Putterman

From Muhammad Ali to Larry Bird to Deion Sanders to Michael Jordan, some of history’s greatest athletes have used trash talk to invade the minds of their opponents in hopes of gaining a competitive edge.

New research from UConn suggests they were likely on to something.

According to a study from Karen C.P. McDermott, competitors on the receiving end of trash talk experience anger and shame, leading to poor performance.

McDermott, who just completed her Ph.D. in communications, studied the effects of trash talk on about 200 participants playing the racing video game Mario Kart. She then analyzed their reported emotions, noting the relationship between anger and shame.

“When we looked at how that connection was working, it was really them feeling shame, which is leading to the anger, which then detracts from their performance,” McDermott said.

As part of the study, McDermott recruited about 200 volunteers between the ages of 18 and 35 and randomly sorted them between a control group and a trash-talk group. She then hired UConn drama students to face the participants in Mario Kart and pepper them with lines such as, “You are awful at this game,” “Grab a straw because you suck!” and “My 3-year-old cousin plays better than you do.”

McDermott surveyed participants before and after they played the game and recorded their levels of cognitive distraction, anger and shame. While distraction did not seem to affect performance, anger and shame had a significant impact.

McDermott said her interest in trash talk began with then-Seattle Seahawks cornerback Richard Sherman, whose harassment of wide receiver Michael Crabtree during and after the 2014 NFC Championship Game made national news. As fans debated whether Sherman’s bravado made him a hero or a villain, McDermott began to think critically about how fans reacted to trash talk, what purpose trash talk can serve and, ultimately, whether trash talk actually works.
McDermott acknowledges that two strangers playing Mario Kart isn’t quite the same as two high-level athletes with a personal history and that her study might not translate perfectly to the pros. She said she hopes future research will build on her findings.

“There not being that much study on trash talk, there’s so much more that needs to be done yet,” she said. “As far as a replication study, it would be interesting to see if you could get it to work for athletes as well.”

For several UConn football players, McDermott’s findings rang true.

“I’m a pretty outgoing guy, so trash talk definitely works for me,” Huskies linebacker Omar Fortt said. “Because I like competing, and I know that I’m not gonna let the dude in front of me beat me. So it definitely motivates me because your adrenaline is up and you’ve got to go play.”

As for the idea that trash talk provokes anger and shame from its victims ...

“I definitely believe that,” Fortt said. “Especially if you can back that up. That’s when you got ‘em.”

Not only can trash talk demoralize opponents, players said, it can also motivate the talker himself. A 2013 Florida State study found that video gamers were markedly more confident when allowed to trash talk than when prohibited from doing so, which helped increase their performance.

“Trash talk is effective because if you trash talk and you don’t back it up, then why are you trash talking?” UConn running back Kevin Mensah said. “If you’re gonna trash talk, then you better be doing the work.”
TWEETING WHILE WATCHING TV MAKES SHOW LESS ENJOYABLE, STUDY FINDS

More than half of people who are 18-24 years old use a “second screen” — a phone connected to social media — while watching TV.

By A. Pawlowski

Armed with a remote in one hand and a phone in the other, TV viewers are now often multitasking — watching a show and tweeting about it at the same time.

But if you really want to escape reality and immerse yourself in the story, put the phone away, the authors of a new study advised.

People who live-tweeted a TV show enjoyed it less than other viewers because such multitasking reduced their ability to be “transported” into the plot and be completely absorbed by it, according to the paper published in the Journal of Broadcasting & Electronic Media.

“This kind of behavior is encouraged by the television and movie industry because they’re thinking about it in terms of user engagement. But user engagement may not necessarily translate into enjoyment,” co-author Saraswathi Bellur, an assistant professor of communication at the University of Connecticut, told TODAY.

“Just because you’re engaged doesn’t actually mean you may actually enjoy the show.”

More than half of people who are 18-24 years old use a “second screen” — a phone connected to social media — while watching TV, research has shown.

The study was based on responses from 230 college students who were 19 years old on average.

All of them watched an episode of “Friends” while being randomly assigned to one of two groups: people in the first group simply watched the show, while people in the other were asked to send at least five tweets about the show while watching.

Afterwards, they filled out a questionnaire about their level of “transportation,” emotions and enjoyment.

The concept of transportation is one of the big reasons why people read books,
watch TV or go to the movies, Bellur said.

“We feel as though we’re transported elsewhere. That’s the fascination with media: For a moment or for a couple of hours, we feel as though we’re somewhere else because the narrative is so immersive,” she noted.

It turned out people who were live-tweeting experienced lower levels of transportation, and fewer positive and social emotions, which, in turn, led to lower levels of enjoyment of the show, compared to people who just watched the episode.

Voluntary interruptions — like typing a tweet — prevent people from closely following the plot and therefore rob them of the enjoyment of watching the show.

“Multi-tasking is a myth. We don’t really multi-task, we just switch between tasks really quickly,” Bellur said. “The primary task usually suffers.”

Bellur believed the findings would apply to people in all age groups. The next step is to test whether live-tweeting would also lessen the enjoyment of TV shows without a narrative, like a news program, sports event or an awards show.

Her advice to people who really want to immerse themselves in a TV show and closely follow the plot: Skip the live-tweeting. Or just pause the episode if you really, really feel the need to tweet.

It’s not the first time social media has been blamed for ruining the enjoyment of a leisure activity. Some complain Instagram travel bragging is killing the family vacation as the social pressure to take big trips can add stress to something that’s supposed to be relaxing.
Daisy Verduzco Reyes wanted to learn how college attendance shapes Latino students’ sense of their place in campus life, and in broader civic life. So the assistant professor of sociology at the University of Connecticut spent two years attending meeting after meeting, and organizational event after organizational event, at three colleges of different kinds.

Such dynamics interested her, she said in an interview, because when she went to the University of California at Santa Barbara as the first member of her San Fernando Valley family to enroll in higher education, she was troubled by tensions among Latino groups over which political stances and actions around ethnic identity were most worthy. “I wouldn’t have thought to study different Latino groups if I hadn’t tried to join them when I was in college,” Reyes said.

She reports the results of her research in Learning to Be Latino: How Colleges Shape Identity Politics (Rutgers University Press, 2018).

The gist of her findings is that each campus — one a liberal-arts college, one a regional university, and one a research institution — “incorporates Latino students differently by adopting and implementing multicultural and diversity projects in its own way,” as she writes. The Latino students’ interactions with one another and with various other groups on campus “influence much more than students’ academic journeys.”

Those interactions shape not only Latino students’ academic achievement but also how they end up “defining what it means to be Latino” and engaging and responding to Latinos’ place in American society, Reyes writes.

College administrators would do well to pay heed to the way similarities and differences in colleges’ cultures affect those students, she suggests, because more than 70 percent of college-age Latinos enroll in higher education, and Latinos account for more than one-sixth of the United States population.

Reyes says that when she undertook to study the campus characteristics that influence how Latino students come to understand their place on campus and in society, she didn’t think the type of campus was going to affect her findings, but it did.

For example, at the research university, Latino groups competed for institutional funds, which led to conflict among them.
At the regional university, almost half of the students were of Latino background, but they spent little time on campus and were less attentive to larger issues of Latino identity than they were to their origins in Latin American countries, such as Mexico and Guatemala.

On the liberal-arts campus, cohesion among Latino groups was greater, apparently because all students lived in something of a campus bubble, and in part because Latino students, who are frequently, like Reyes, the first in their families to attend college, often felt marginalized on a campus of predominantly affluent students.

Other factors that played a role in the differences included residential arrangements, the health and variety of diversity programs, policies for incorporating nonmajority students, student-teacher ratio, and racial and ethnic demographics.

In varying combinations, such factors influence how Latino students relate to one another and to others on campus, including administrators. In that sense, the combinations of approaches that help Latino students thrive on campuses, and the harmful forces such as “microaggressions” that they might experience from other students, compose “a kind of hidden curriculum that greatly extends colleges’ pedagogical effects,” she writes. It shapes students’ sense of “ethnic-racial boundaries and identities” and, from that, the political agendas they may adopt to deal with issues that trouble them.

Administrators can take a variety of steps to help Latino students find their way to fulfilling political and social roles, Reyes said. Administrators can, for example, create courses about their campus’s own history of activism against racial inequities, or even first-year seminars on educational inequality — “so that the weight of making a change does not rest mainly on Latino students’ shoulders.”
WHERE IS THE BOUNDARY BETWEEN YOUR PHONE AND YOUR MIND?

As our online existences become less distinct from ‘real life’, experts raise concern about the growing power of big tech

By Kevin Lincoln - PS Mag

Many of the boundary lines in our lives are highly literal, and, for the most part, this is how we’ve been trained to think of boundaries: as demarcations shored up by laws, physical, legal, or otherwise, that indicate exactly where one thing ends and another begins. Here is the border of your property; here is the border of your body; here is the border of a city, a state, a nation – and to cross any of these boundaries without permission is to transgress. But one of the most significant boundary lines in our lives is not this way, and one piece of ubiquitous technology is making this line increasingly permeable and uncertain, at a cost that we may only be starting to comprehend.

Here’s a thought experiment: where do you end? Not your body, but you, the nebulous identity you think of as your “self”. Does it end at the limits of your physical form? Or does it include your voice, which can now be heard as far as outer space; your personal and behavioral data, which is spread out across the impossibly broad plane known as digital space; and your active online personas, which probably encompass dozens of different social media networks, text message conversations, and email exchanges?

This is a question with no clear answer, and, as the smartphone grows ever more essential to our daily lives, that border’s only getting blurrier.

Michael Patrick Lynch, a professor of philosophy at the University of Connecticut and director of the school’s Humanities Institute, which promotes interdisciplinary research, says that the notion of an “extended self” was coined by the philosophers Andy Clark and David Chalmers in 1998.

“They argued that, essentially, the mind and the self are extended to those devices that help us perform what we ordinarily think of as our cognitive tasks,” Lynch says. This can include items as seemingly banal and analog as a piece of paper and a pen, which help us remember, a duty otherwise performed by the brain. According to this philosophy, the shopping list, for example, becomes part of our memory, the mind spilling out beyond the confines of our skull to encompass anything that helps it think.
“Now if that thought is right, it’s pretty clear that our minds have become even more radically extended than ever before,” Lynch says. “The idea that our self is expanding through our phones is plausible, and that’s because our phones, and our digital devices generally – our smartwatches, our iPads – all these things have become a really intimate part of how we go about our daily lives. Intimate in the sense in which they’re not only on our body, but we sleep with them, we wake up with them, and the air we breathe is filled, in both a literal and figurative sense, with the trails of ones and zeros that these devices leave behind.”

This gets at one of the essential differences between a smartphone and a piece of paper, which is that our relationship with our phones is reciprocal: we not only put information into the device, we also receive information from it, and, in that sense, it shapes our lives far more actively than would, say, a shopping list. The shopping list isn’t suggesting to us, based on algorithmic responses to our past and current shopping behavior, what we should buy; the phone is.

At the beginning of his recent book The Internet of Us, Lynch uses a thought experiment to illustrate how thin this boundary is. Imagine a device that could implant the functions of a smartphone directly into your brain so that your thoughts could control these functions. It would be a remarkable extension of the brain’s abilities, but also, in a sense, it wouldn’t be all that different from our current lives, in which the varied and almost limitless connective powers of the smartphone are with us nearly 100% of the time, even if they aren’t – yet – a physiological part of us.

“One of the biggest shifts is the undoing of a border that we used to perceive between the virtual and the physical world”

— Moira Weigel

According to data released in 2017 by the analytics firm Flurry, American consumers spent five hours per day on their mobile devices, and showed a dizzying 69% year-over-year increase in time spent in apps like Facebook, Twitter, and YouTube. The prevalence of apps represents a concrete example of the movement away from the old notion of accessing the Internet through a browser and the new reality of the connected world and its myriad elements – news, social media, entertainment – being with us all the time.

When Moira Weigel, a writer and junior fellow at Harvard University, was researching her book Labor of Love: The Invention of Dating, she found that 2009, as the Facebook and Twitter mobile platforms were taking off and our social media identities became increasingly woven into our daily life, seemed to be a focal point in the transition away from separate notions of online and IRL (“in real life”). She points to online dating as a good example. Even if you hadn’t met someone on an app, you wouldn’t go out with them before checking out their Facebook profile or their Instagram. Our online identities had become a part of who we were in the world – whether we were aware of it or not.

“In the 90s and even through the early 2000s, for many people, there was this way of thinking about cyberspace as a space that was somewhere else: it was in your computer. You went to your desktop to get there,” Weigel says. “One of the biggest shifts that’s happened and that will continue to happen is the undoing of a border that we used to perceive between the virtual and the physical world.”
The debate over what it means for us to be so connected all the time is still in its infancy, and there are wildly differing perspectives on what it could mean for us as a species. One result of these collapsing borders, however, is less ambiguous, and it’s becoming a common subject of activism and advocacy among the technologically minded. While many of us think of the smartphone as a portal for accessing the outside world, the reciprocity of the device, as well as the larger pattern of our behavior online, means the portal goes the other way as well: it’s a means for others to access us.

Most obviously, this can take the form of the omnipresent harassment that many people experience online, as well as more specific tactics, like revenge porn and the leaking of nude pictures; doxxing, or the revealing of someone’s personal details; and swatting, the practice of calling a Swat team to an individual’s home under false pretenses.

Less clear to most people, however, is the extent to which the companies that make the technology, apps, and browsers that we use are not just tracking but shaping our behavior. While this issue has recently come to the fore as a result of revelations like the Cambridge Analytica scandal, Weigel sees the unfettered access to our data, through our smartphone and browser use, of what she calls the big five tech companies – Apple, Alphabet (the parent company of Google), Microsoft, Facebook, and Amazon – as a legitimate problem for notions of democracy. Thanks to the border-breaking nature of these technologies, and particularly the smartphone, the success of these companies has put an unfathomable amount of wealth, power, and direct influence on the consumer in the hands of just a few individuals – individuals who can affect billions of lives with a tweak in the code of their products.

“This is where the fundamental democracy deficit comes from: you have this incredibly concentrated private power with zero transparency or democratic oversight or accountability, and then they have this unprecedented wealth of data about their users to work with,” Weigel says. “We’ve allowed these private companies to take over a lot of functions that we have historically thought of as public functions or social goods, like letting Google be the world’s library. Democracy and the very concept of social goods – that tradition is so eroded in the United States that people were ready to let these private companies assume control.”

Considering the magnitude of the iPhone’s impact, it’s hard to believe that it came out barely over a decade ago. But while the influence of both the phone itself and the tech revolution as a whole can often feel irresistible – look no further than those usage numbers – there are measures that could be taken to help shore up our crumbling borders.

Tim Hwang, a writer and researcher in San Francisco who used to work as the global public policy lead for artificial intelligence and machine learning at Google, has thought extensively about how these devices foster the functioning of the collective in addition to the individual. About a decade ago, he explains, the rhetoric around the Internet was that the crowd would prevent the spread of misinformation, filtering it out like a great big hive mind; it would also help to prevent the spread of things like hate speech. Obviously, this has not been the case, and even the relatively successful experiments in this, such as Wikipedia, have a great deal of human governance that allows them to function...
properly. He says that the pessimism resulting from this realization has led us to give power to the platforms so that they can regulate themselves – allowing Facebook to tell us what’s true and what’s not – but that there is another approach to the way we actually exist in these spaces.

“Are there tools, are there designs we can put in place to allow communities to do a better job at self-governance?” Hwang asks. “Do we want to give more moderation to particular users? Does the platform want to grant users more power to control issues of harassment and hate speech, knowing that, in some cases, it might be over-applied?”

Weigel sees two potential opportunities for limiting the amount of influence the big five has on consumers. The first would be legal; she cites a growing body of work exploring possible antitrust suits designed to break up these companies. Writing in Logic, a magazine Weigel co-founded, K Sabeel Rahman, an associate professor of law at Brooklyn Law School who writes about inequality and democracy in the modern economy, compares these potential efforts to those that broke up the industrialists in the late 19th and early 20th centuries. “Today, as technology creates new forms of power, we must also create new forms of countervailing civic power,” Rahman writes. “We must build a new civic infrastructure that imposes new kinds of checks and balances.”

The other option is for workers, many having entered tech with idealistic rather than financial motives, to help regulate and restrict their own employers. Many have already begun to express regret over the effectiveness of their innovations, a phenomenon perhaps best exemplified by the Center for Humane Technology, led by the former Google design ethicist Tristan Harris. But Weigel views these efforts with suspicion due to the idea that they often follow the same playbook as the paternalistic, top-down design infrastructure that created these problems in the first place.

A more fitting example of positive change, Weigel suggests, took place in June, when Google employees successfully campaigned for the company to stop its work with the Pentagon on Project Maven, a program that improved the effectiveness of military drones.

“Reading the New York Times, especially until about six months ago, whenever this tech backlash started, I feel like you could be forgiven for thinking there were five people in the tech industry,” Weigel says, laughing. “In fact, these are huge companies that employ tens of thousands of people, many of whom don’t necessarily agree with everything the companies are doing. I think that engineers have enormous power to influence these companies for the better right now.”

Lynch, the University of Connecticut philosophy professor, also believes that one of our best hopes comes from the bottom up, in the form of actually educating people about the products that they spend so much time using. We should know and be aware of how these companies work, how they track our behavior, and how they make recommendations to us based on our behavior and that of others. Essentially, we need to understand the fundamental difference between our behavior IRL and in the digital sphere – a difference that, despite the erosion of boundaries, still stands.

“Whether we know it or not, the connections that we make on the Internet are being used to cultivate
an identity for us – an identity that is
then sold to us afterward,” Lynch says.
“Google tells you what questions to ask,
and then it gives you the answers to
those questions.”

And we should especially recognize
this when it seems least clear: in those
situations online that most closely
seek to emulate the structures and
dynamics of real life. Like, for example,
your relationships. It isn’t enough that
the apps in our phone flatten all of the
different categories of relationships
we have into one broad group: friends,
followers, connections. They go one step
further than that.

“You’re being told who you are all the
time by Facebook and social media
because which posts are coming up from
your friends are due to an algorithm that
is trying to get you to pay more attention
to Facebook,” Lynch says. “That’s
affecting our identity, because it affects
who you think your friends are, because
they’re the ones who are popping up
higher on your feed.”

This story originally appeared on Pacific
Standard, an editorial partner site.
Age really is just a number. Science is finding that how old you feel may actually predict how long you’ll live, how happy you are, and your general state of health for the next two decades, says Jennifer Bellingtier, Ph.D., a postdoctoral psychology researcher at Friedrich Schiller University in Germany.

“That mental state is known as subjective age, and it reflects your perception of how well you’re growing older,” she says. “If you think you’re aging poorly, you may be less motivated to exercise, eat well, or engage in other healthy behaviors.” (Related: The Best Anti-Aging Workout You Can Do)

Subjective age is incredibly powerful. Studies show that adults who feel younger have fewer signs of brain aging and better muscular, pulmonary, and metabolic functions compared with those who feel older.

Fortunately, perception of age is something you can easily control and change for the better. Start with these four techniques, which have been scientifically proved to help you stay young, inside and out.

**Don’t stress over the little things.**

Even minor irritations like a disagreement with a friend or an unexpected traffic jam can build up, leaving you irritable and exhausted—which in turn can make you feel older, research shows.

One way to avoid becoming overwhelmed by little stressors is to vary your routine, says Robert Leahy, Ph.D., the director of the American Institute for Cognitive Therapy. Tweaking your behaviors makes your brain more malleable, so you can maintain a more positive point of view in the face of daily stress. Simple acts like going for a bike ride instead of a run, or scheduling lunch or coffee dates with new acquaintances, can make the difference. (Also try these anxiety-reducing techniques for common worry traps.)

**Find the upside.**

Some evidence indicates that
perfectionism increases subjective age, says Bellingtier. Perfectionists tend to be hard on themselves. They might criticize how they look or how they perform compared with another person in their workout class and gradually begin to feel old.

A technique called positive reframing can ease the hypercritical nature of perfectionism, says Leahy. Let’s say you’re beating yourself up for missing a deadline at work. Using positive reframing, you might focus on the fact that you’ve learned something valuable about handling your to-dos better. (Related: These Three Words Are Turning You Into a Negative Person)

This strategy may seem forced when you first give it a try, but as it becomes more natural it will soften the edges of your perfectionistic tendencies, and you’ll start to feel younger and happier. (P.S. How you feel about your body majorly affects your happiness level too.)

**Work it out.**

Exercise makes you healthier, stronger, and happier, all of which have positive effects on your subjective age.

In a study from the University of North Carolina, Greensboro, adults who were asked to increase their daily step count walked away feeling younger than those who were more sedentary. Working on developing your athletic skills through small, manageable goals—like increasing your running distance or advancing your yoga pose—may be especially beneficial, says Bellingtier. (Related: How to Lengthen Your Telomeres with Exercise—and Why You’ll Want to)

Feeling in control increases what experts call personal mastery, and people with a greater sense of that quality felt younger than others, the journal *Aging and Mental Health* reports. Being in charge of your life gives you a sense of satisfaction and accomplishment.

**See new places.**

Traveling makes adults in their 40s and 50s feel younger, according to studies at the University of Connecticut. “Other research suggests that people who are open to new experiences, like learning about different cultures, also tend to feel more youthful,” says Bellingtier. (See: The Health and Fitness Benefits of Trying New Things)

Why? Travel exposes you to activities and adventures. Being willing to try new things may encourage a general curiosity about the world, and that sense of wonder can make you feel youthful, researchers say. Plus, doing things that are completely novel activates the brain’s feel-good dopamine system, studies show, leaving you energized and excited about life. (Next up: Other things you can do to slow down your body’s aging process.)
STORRS — Election Day requires quite a bit of preparation and planning for poll workers.

But with the help of new technology, the process may soon become more efficient in the state of Connecticut.

Led by Alexander Russell, a group of researchers at the University of Connecticut Center for Voting Technology Research (VoTeR Center) are investigating technology that will enable poll workers to check-in voters electronically.

“One of the most time-consuming parts of the election for the registrars is that, at the end of the election, they have to enter it into an election database of all the people who voted,” said Russell, who has been director of the VoTeR Center for about a year.

Russell, a computer science professor at UConn, studies the security of voting technology.

He has been working at UConn since 1999 and has been a principal researcher at the center since 2006, becoming director of the center last September.

“If all goes well, registrars may soon be using electronic poll books, or “e-pollbooks,” which typically come in the form of a laptop or tablet, to check in voters.

VoTeR employees are also currently looking into new technology to tabulate votes.

Russell said the current tabulators are a decade old.
“One of the major activities that we are looking forward to next year is basically auditing the current entries on the tabulator market to make sure we can find something we’re satisfied with,” he said.

Russell said it is “very important” to have paper ballots and then have a machine that counts the ballots.

“There are tabulators that are still on the market that don’t do this,” he said.

Russell said there are tabulators on which people vote on a touch screen.

He said when using technology during an event as critical as the election, it is “extremely important to err on the side of safety” rather than convenience.

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**Big Think**

**HEARTBEATS ALIGN DURING AN ISLAMIC RITUAL, NEW STUDY FINDS**

Researchers found that the hearts of Sufi devotees harmonized as one during a mystical practice. And this isn't the first study to show heart synchronization between people.

By Molly Handon

- **Anthropologists at the University of Connecticut** discovered that the heartbeats of Sufi practitioners synchronized during an important ritual.

- Other studies have also found that individuals who are closely connected emotionally and socially experience physiological alignment.

- Sufism is a mystical component of Islam that emphasizes coming to know God through direct experience, like trance.

New, unpublished research claims that during an important Sufi ritual, the heartbeats of participants unified.

*This article was published on October 7, 2019.*
What is Sufism?

Sufism is a mystical dimension of the Islamic faith. Dimitris Xygalatas and Christopher Manoharan, two anthropologists at the University of Connecticut who conducted the study, describe it as “a meditative and highly devout form of Islamic worship that emphasizes a heart-based knowledge of God’s oneness.” This is a spiritual knowledge that Sufis call marifat, which practitioners come to know through direct experience such as meditation, dreams, music, ritual, and entrance into deep states of religious trance.

According to Xygalatas and Manoharan, the largest and most important Sufi ritual is the dhikr. Translating to “remembrance,” it is often referred to by Sufis as “the way of the heart.” This communal ritual lasts several hours and includes devotees joining together in deep meditation or ecstatic trance, and sacred sound and movement including the whirling dervish, a dancing meditation started by the 13th-century Sufi mystic and poet Jalaluddin Rumi.

The authors, who study ritual and religion, did an in-depth study on a Sufi Muslim congregation called the Uşşaki order that meets weekly in downtown Istanbul for a dhikr ritual. In the study, Xygalatas took a unique ethnographic approach. He monitored 20 of the practitioners’ heart rates using heart monitors worn under their garments. The reason for doing this was because, according to Sufi’s, during their ritual hearts are said to “beat as one” as they come together to remember Allah.

“We were curious to see whether this notion would be supported by biological data,” wrote Xygalatas and Manoharan. “Our recent (not yet published) research shows that their quest to unify hearts in celebration of God does go beyond metaphor: Their hearts really do beat as one.”

The discovery, though deeply intriguing, is not unprecedented. Other studies have found that individuals who are closely connected emotionally and socially experience physiological synchronization. For example, a 2013 study found that lovers’ heart beats synch up. And, in another study reported by Aeon, during intense rituals like fire-walking, remarkable degrees of heart-rate harmonization were found between the participants of the event as well as onlookers. Similarly to the study on lovers’ heart rates, the study on fire-walking found that the participant’s heartbeat was more closely aligned with those he was in social proximity to, such as his wife or friends. This correlation was so strong that researchers were actually able to predict the level of social proximity between two people solely by looking at the heart-rate data.

A natural explanation

What these heartbeat studies tells us is that, although we may believe we live our lives in isolated bodies, we are not physically severed off from the rest of the world. Natural rhythms have influence over us and our relations to others. In fact, according to Michael Richardson, a psychologist at the University of Cincinnati in Ohio, the harmonization of heartbeats is a part of a natural law.

“The natural law of coupled oscillators holds that when two or more rhythms meet, they will become coordinated—a phenomenon seen across the natural world, from fireflies matching their flashes to groups falling into step,” Richardson told National Geographic in 2011.

It has long been the subject of
fascination by anthropologists and sociologists that rituals, particularly intense rituals, bind people together. Research like that conducted by Xygalatas and Manoharan on Sufis is starting to give us a glimpse at how bonding is achieved at the physiological level.

Strong social connections have long been linked to living a healthier, longer, happier, and more meaningful life. But to achieve the social binding benefits of the Sufi’s heart-synching practice, you don’t need to attend a dhikr or adhere to any religion at all. If group prayer, or walking barefoot over scalding coals, isn’t really your thing, similar states can be achieved simply by snuggling with a pet you love, going to a theater performance, or rapturously belting out your favorite songs with your friends this weekend. (Ideally in harmony.)

WHAT NEARLY ALL LANGUAGES HAVE IN COMMON—WHETHER YOU SPEAK OR SIGN

By University of Chicago

If you hear someone say “John and Mary kiss,” you’d likely imagine a single symmetrical action. But hear them say “John and Mary kiss each other,” and you may construe an entirely different picture—one in which the parties reciprocate with two separate actions, kissing the other’s hand.

A distinction this subtle might not seem important, yet it appears across nearly all spoken languages. In fact, this distinction may be intrinsic to the very development of language, according to new research co-authored by a leading psychologist at the University of Chicago. Published May 28 in the Proceedings of the National Academy of Science, the study found that sign language users in Nicaragua also distinguished between the concepts of symmetry and reciprocity—despite having developed their language in isolation.
Less than a half-century old, Nicaraguan Sign Language offered researchers their first chance to observe the growth of a new language in real time. In the mid-1970s, a group of about 50 deaf children were brought together to a school for special education in Managua, the country’s capital. Because deaf individuals in Nicaragua had had almost no prior opportunities to interact, the founding of the school created a situation for them to develop language without the influence of existing languages.

That such fine linguistic differences exist in a young language suggests that these properties are universal. The study also found the distinction among a handful of homesigners, deaf individuals who interact only with hearing individuals.

“If language were wiped out tomorrow and people had to reinvent it, I bet they would still distinguish between symmetrical and reciprocal events,” said study co-author Susan Goldin-Meadow, who has helped define the fields of gesture and non-verbal communication. “Other properties of language might not be reinvented, but this distinction appears to be so fundamental to human language that it would be.”

Researchers showed video clips depicting actions that could be construed as symmetrical or reciprocal, then asked study participants to describe what they saw. Courtesy of Susan Goldin-Meadow, et al.

The researchers studied 27 deaf individuals in Nicaragua, four of whom were adult homesigners who each developed a gesture language outside of the signing community. Ranging in age from 18 to 45, each participant watched a series of video clips showing actions that could be construed as symmetrical (e.g., high-fiving) or reciprocal (e.g., punching). Participants were then asked in gesture or sign to describe those videos.

All the signers in the study made formal distinctions in their descriptions despite the fact that, in the videos, the reciprocal events (punching) looked just as symmetrical as the symmetrical events (high-fiving). For example, signers used a two-handed symmetrical form to represent two people high-fiving, but used two one-handed asymmetrical forms, produced sequentially, to represent two people punching each other at the same moment.

This type of evidence can help researchers figure out the conditions under which properties of language emerge. A property that a homesigner develops, for example, would likely emerge in all human communication systems—even in the absence of a communication partner or a language model. Other language properties might require a partner, or a structured learning process to ensure they are passed down from generation to generation.

To further this field of research, Goldin-Meadow hopes to study if and when babies begin to distinguish between events that can be construed as symmetrical or reciprocal.

But why is such a distinction so omnipresent in human languages? That’s a question researchers still can’t answer.
“There are many other cognitive structures that we don’t bother to encode in our language,” Goldin-Meadow said. “Our study can’t explain why languages distinguish between symmetrical and reciprocal events, but it does tell us that this distinction is important to the human mind and to communication.”

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**Down to Earth Magazine**

**‘INDIGENOUS PEOPLE HAVE BEEN EFFECTIVE STEWARDS OF BIODIVERSITY GLOBALLY**

Down To Earth speaks to University of Connecticut professor Prakash Kashwan about his book, *Democracy in the Woods*.

By Ishan Kukreti

*Prakash Kashwan is an associate professor in the Political Science department at the University of Connecticut, United States. His research, scholarship, and teaching focuses on climate justice, global climate governance, international and environmental policy and politics, and political economy of development. He speaks to Ishan Kukreti on his work, *Democracy in the Woods: Environmental Conservation and Social Justice in India, Tanzania, and Mexico.*

Excerpts:

How did the idea of Democracy in the Woods take shape? Why compare three countries that are so different from one another?

This book has its roots in my doctoral research that analysed the Forest Rights Act (FRA); specifically, the policy debates and implementation challenges about the relationship between community forest rights and household land rights. This was an extremely exciting project that allowed...
me to bring together disparate theories.

However, in developing the dissertation into a book in the year 2012, I wanted to focus on bigger questions of how the international and national political economy processes and structures shape the relationship between environmental conservation and social justice.

The questions of forestland contestations are highly salient in India, Tanzania, and Mexico, though each of them differ significantly in the large political economic factors that shape the political and policy processes that are central to the book’s argument.

Could you summarise the book’s main argument for our readers?

The main argument is that the relationship between conservation and social justice, which also intimately mirrors the relationship between the environment and development, is contingent on how social groups with competing interests in the environment are represented in the political and policy process.

Through a systematic comparative analysis, Democracy in the Woods shows that political and policy processes in these three countries more or less inclusive, because of the following factors:

1. The balance of political and economic power that different social groups enjoy
2. The types of political imperatives that policymakers encounter
3. The ways in which the state functions at national and subnational levels.

My analysis of the Mexican case and the specific instances of success in India, specifically in the first decade of the twenty-first century, show that the radical potential of socially just environmental conservation efforts takes root in the interstices of mass politics and formal institutional politics.

An important goal of the book is to bridge the longstanding chasm between policy scholars who think of policymaking as a techno-managerial process and several types of ‘critical scholarships’, which emphasise the social and cultural aspects of nature-society interface.

While recognising that each of those aspects matters, Democracy in the Woods develops a framework to investigate the ways in which political and policy processes determine whether and how myriad contestations over the environment and social justice are framed, translated into specific policy proposals in the legislature, and implemented with varying degrees of sabotage and success.

In this book, you have talked about different colonial experiences shaping the forest policies of nations differently. Why do you think these countries continue to harbour more or less the same colonial policies and attitudes even after independence?

In a small way, this book seeks to challenge the over-generalisation of the argument about colonial hangover. Chapter 2 in the book engages carefully with the colonial history in each of these countries and maps out the differences in the long-term effects on them.

Mexico’s forest policy is not colonial or neocolonial, while India’s forest policy, other than the FRA, is decisively neocolonial. Even Tanzania’s forest policies and laws offer stronger rights
to local residents, though in practice, Tanzania's forestry sector remains heavily controlled by the forestry and wildlife agencies — more than 38 per cent of the total land there is designated as national parks or wildlife reserves.

Coming back to India's case, the fact that our forest policy remains colonial is not because of some unavoidable path dependence, but because it serves the interests of our heavily bloated forest bureaucracy and the advocates of exclusionary conservation, who benefit from the status quo.

You also talk about Mexico's community forest regime, and how it is more equitable than the other case studies in your book. Could you elaborate on how it is different — in essence and practice — from India's under FRA?

There are two big differences. The first one is related to the autonomy of forest management powers that are vested in the hands of community groups. While this is a complex topic, it manifests in the allocation of timber rights — in Mexico, community forestry is synonymous with timber rights, while in India, even forest rights activists do not talk of timber rights.

While the Mexican community forestry programme has its own challenges, the debates and discussions there are at a very different level altogether. The second difference, which I believe I am the first one to bring up in a comparative context, is the 'territorial authority' that undergirds the differences in the power and authority that forestry agencies enjoy.

In India, and large parts of Asia and Africa, forestry agencies enjoy territorial authority, that is, they "own" the lands designated as state forestlands. On the other hand, because of the differences of colonial history and land redistributions following the peasant revolution of the first decade of the twentieth century in Mexico, local communities enjoy legal ownership of nearly 70 per cent of Mexico's forestland.

The territorial authority that forest departments (FDs) enjoy in India create perverse incentives for the ministry and the FDs to invest their energies in maintaining their control of forestland, which is not same as promoting forest and biodiversity conservation.

We can talk more about this in the context of ongoing policy processes. But these are the factors that one doesn’t think about unless one looks across international borders and across different world regions that operate under an entirely different framework of resource relations.

With FRA, India too has tried to move towards a community-owned forest management regime. How do you assess India's performance?

The FRA is a great step forward, but we need to do a lot more to address the larger question of the territorial authority of the forest departments. The FDs have sabotaged the FRA implementation, and this applies not just to the question of household land rights but also collective forest rights, with the exception of notable successes in parts of Maharashtra.

Second, the FDs have completely undermined the application of the FRA provision of Critical Wildlife Habitats (CWHs). CWHs offer a valuable framework for making use of the science of conservation, without giving up on the procedural rights that the FRA grants to forest-dependent groups.
The question of forest rights is closely associated with concerns about conservation and biodiversity. Do you think conservation and forest rights can go hand in hand? And are there any successful examples of national level community-driven conservation practices?

Washington DC-based Rights and Resources Initiative has done a wonderful job of collating dozens of studies that show that indigenous people and other forest-dependent groups have been effective stewards of forests and biodiversity in hundreds of sites throughout the world.

Other than the Mexican case I studied, Nepal has a very successful community forestry program, in which communities enjoy timber rights. That has aided, not adversely affected, forest conservation in Nepal.

How do the ongoing discussions about forest-based climate mitigation interventions shape national policies. Do you believe they have affected India’s forest policies?

That is a good question — Democracy in the Woods shows that the same set of international policies, such as forest-based climate mitigation programmes or REDD+, produce very different effects in these three countries.

First, the policymaking process has been very different — the Indian policy process related to REDD+, and I would argue, climate policy more generally, has been least participatory and least transparent, where the ministry has not seriously engaged with credible and internationally reputed think tanks, such as Centre for Science and Environment and Centre for Policy Research.

Mexico’s REDD+ discussion has been relatively more transparent and it has been carried out within the purview of country’s national climate law. In the book, I cite concrete examples of how Mexico’s indigenous and peasant federations were able to influence the REDD+ policy, which offers a formal recognition of the carbon rights of the indigenous and forest-dependent people.

Some would characterise this as a reflection of a greater ‘neoliberalisation’ of policy process in Mexico, which I wouldn’t dispute. However, it is important to recognise that not recognising the community’s rights to benefit from the efforts they put into forest and landscape conservation leaves the policy space to the agencies and officials with those perverse incentives to centralise control and use forestlands for fast-growing tree crops.

On the contrary, India’s Union Ministry of Environment and Forests, and the FDs, have developed plans and projects to exploit the opportunities offered by international carbon forestry to wrest control of areas that were traditionally under shifting cultivation, but are now under more or less fully sedentarised agriculture.

The recent efforts to dispossess nearly 10 million adivasis and other forest-dependent people of their land rights is certainly motivated by the FD’s interest in reinforcing its territorial control of the land formally designated as state forestland.

But, my hope is that these plans will be defeated. We are seeing the emergence of a robust transnational movement that connects community movements to global policy debates. Democracy in the Woods, metaphorically speaking, has a fighting chance.
Acrylics are an incredibly diverse and useful family of chemicals used in all kinds of products, from diapers to nail polish. Now, a team of researchers from UConn and ExxonMobil describe a new process for making them. The new method would increase energy efficiency and reduce toxic byproducts, they report in the Feb. 8 issue of *Nature Communications*.

The global market for acrylic acid is enormous. The world used close to 5 million metric tonnes of it in 2013, according to industry group PetroChemicals Europe. And no wonder, for acrylics and the closely related acrylates are the building blocks for many kinds of plastics, glues, textiles, dyes, paints, and papers. Strung together in long chains, they can make all kinds of useful materials. Acrylate mixed with sodium hydroxide, for example, makes a super absorbent material used in diapers. Add extra methyl groups (carbon plus three hydrogens), and acrylate makes plexiglass.

The current industrial processes for making acrylics require high temperatures close to 450 F, and produce unwanted and sometimes harmful byproducts, such as ethylene, carbon dioxide, and hydrogen cyanide.

**UConn chemist Steve Suib, director of the University’s Institute for Materials Science**

*Science*, and colleagues at UConn and ExxonMobil have designed a new way of making acrylics at mild temperatures. Their technique can be finely tuned to avoid producing unwanted chemicals.

“Scientists at ExxonMobil Research & Engineering partnering with professor Suib’s group in UConn have been probing new technologies that can lower energy intensity, skip steps, improve energy efficiency, and reduce CO2 footprint in the production process of acrylics,” says Partha Nandi, a chemist at ExxonMobil.

“The recent publication in *Nature Communications* describes discovery of a new route to produce a class of acrylate derivatives in potentially fewer steps and with less energy.”

The technique uses a porous catalyst made of manganese and oxygen. Catalysts are materials used to speed up reactions. Often, they provide a surface for the molecules to sit on while they react with each other, helping them to meet up in the right configurations to do the deed. In this case, the pores fill that role. The pores are 20 to 500 Angstroms wide, big enough for fairly large molecules to fit inside. The manganese atoms in the material can trade their electrons with nearby oxygens, which makes it easier for the right chemical reactions to happen. Depending on the starting ingredients, the catalyst can facilitate all different kinds of acrylics.
and acrylates, with very little waste, Suib says.

“We hope this can be scaled up,” he says. “We want to maximize yield, minimize temperature, and make an even more active catalyst,” that will help the reaction go faster. The group also found adding a little bit of lithium helped speed things up, too. They are currently studying the exact role of lithium, and experimenting with ways of improving the manganese and oxygen catalyst.
Research of Michele Baggio
IT IS COMMON knowledge that smoking marijuana causes cravings for high-calorie snacks. The condition, known as the munchies, is a staple of popular culture. (Snoop Dogg, a rapper and notorious stoner, even penned a cookbook.) Yet empirical evidence of the phenomenon and its effects is scarce. Does getting high cause smokers to consume more junk food? And if so, by how much?

To answer this question, **Michele Baggio of the University of Connecticut** and Alberto Chong of Georgia State University examined state laws in America. Since the mid-1990s, more than 30 states have authorised marijuana for medical purposes and 11 have legalised it for recreational use. Because these laws were enacted at different times and in different places, they created a natural experiment for researchers to study the effects of marijuana—including its effect on food consumption.
Here’s something getting a nice high from recreational marijuana: snack food sales.

Sales of snacks in states that have legalized recreational marijuana had a compound annual growth rate of 7.2% over the last four years versus 6% growth in other states, according to data released Wednesday from research group Nielsen.

“Marijuana consumption has been clinically and anecdotally shown to increase a consumers’ appetite and enjoyment of food,” the report said. “And sales data from within the U.S. Census divisions where cannabis has been legalized for recreational use supports the munchies’ effect.”

There were $29.9 billion in salty snack sales from April 2018 to April 2019, according to Nielsen, up from $27 billion for the 12 months to April 2017.

The company’s recent research supports an earlier study that determined potato chip, cookie and ice cream sales all increased in Colorado, Oregon and Washington as recreational marijuana became legal in those states.

Specifically, chip sales increased 5.3%, while cookie sales climbed 4.1% and ice cream purchases increased 3.1% in the aftermath of legalization, professors from the University of Connecticut and Georgia State University determined, using monthly retail scanner data from 2006 to 2016.

“The increase in sales starts at the time of the legislation becomes effective,” said the findings, published in Social Science Research Network in April 2019. Afterwards, the snacking spurt decreased slightly for ice cream and chips, but not for cookies, according to the results.

“These might seem like small numbers. But they’re statistically significant and economically significant as well.”

—Michele Baggio, assistant professor of economics at the University of Connecticut

“These might seem like small numbers,” said University of Connecticut assistant professor of economics Michele Baggio. “But they’re statistically significant and economically significant as well.”

The study noted scientists have theories on the neuroscience behind the cannabis-induced cravings, but the phenomenon’s inner workings are still not known.

See also: In states where marijuana is legal, licensed dispensaries are pushing out drug dealers

“A widespread urban myth is that marijuana consumption is associated with the so-called munchies, namely an irresistible urge to consume large amounts of snack or junk food, such as ice cream, cookies, candies, and the like,” the researchers wrote.

The University of Connecticut study may have focused on the three states to the west of the Mississippi River, but 11 states overall and the District of Columbia have legalized recreational marijuana for ages 21 and older. Illinois’ legalization for recreational use takes effect next year.

It might harsh their mellow, but consumers might want to remember that snacking and fast food trips can pack on the pounds.

A widespread urban myth is that marijuana consumption is associated with the ‘munchies,’ an irresistible urge to consume large amounts of snacks.

In fact, when researchers at Boston University looked at current offerings at national chains like McDonald's MCD, -0.18%, Wendy’s WEN, -0.26% and Burger King QSR, -1.01% and compared them to menus from the 1980s, the calorie counts had climbed noticeably, they determined.

The calories are rising even as chains and food manufacturers try to also introduce more healthful, plant-based options amid America’s continuing obesity epidemic.

The University of Connecticut study didn’t specify which brands had a boost in sales.

Fast food and snack product giants like Yum! Brands YUM, -0.04%, Frito-Lay PEP, +0.38% and McDonald’s could not be immediately reached for comment. SNAC International, a snack food industry trade association, also did not immediately respond to a request for comment.

Tim McIntyre, a spokesman for Domino’s DOM, -0.03%, told MarketWatch the company analyzes its sales “in myriad ways, but have yet to look at pizza sales in states with legalized marijuana versus states where it is still illegal.”

Baggio said his future research laid the groundwork for a look into any links between recreational marijuana and obesity. Baggio said he wasn’t pushing for or against legalization. “I’m just interested in whether there are unintended consequences to the policy,” he said.
LEGALIZING MARIJUANA LINKED TO HIGHER JUNK FOOD SALES, STUDY FINDS

By University of Connecticut

New research suggests that an old marijuana myth might actually be true.

A study published this month the Social Science Research Network found an increase in the purchase of high-calorie foods in states right after legal marijuana programs are introduced.

*Experts from the University of Connecticut*, Andrew Young School of Policy Studies, and the Institute for Corruption Studies examined retail scanner data from more than 2,000 counties across the U.S. from 2006 to 2016.

They found causal evidence that marijuana legalization was associated with higher junk food purchases.

Average monthly sales of ice cream, cookies and chips rose to 3.1 percent, 4.1 percent and 5.3 percent, respectively, right after a state’s legal marijuana system went into effect.

“The increase in sales starts at the time of the legislation becomes effective,” the study authors wrote. “The effect slightly decreases in the semesters thereafter for ice cream and chips, but not for cookies.”

These statistics fall in line with two previous findings. A 2014 scientific study by the Smithsonian found that using marijuana can boost pleasure from foods that smell good, and a 2018 Washington State University study found that small doses of cannabis can release a hormone that informs the brain of hunger sensations.
The munchies — that sudden increase in appetite that often occurs after smoking or ingesting cannabis.

It’s one of the most well-known effects of marijuana use and Dr. Jordan Tishler, a Harvard-educated physician and chief executive officer of inhaleMD, says it’s “absolutely real.”

He pointed out that the effect can be “useful in some patients” such as those who are living with chronic nausea and need to have their appetite stimulated.

However, he acknowledged that (for the most part) getting the munchies is an “unhelpful” effect for the average person.

“There is nothing known to counteract this phenomenon either,” Tishler told Healthline.

That’s one reason some researchers are concerned that increased legalization of cannabis could increase the growing obesity crisis in the United States.

A recent study looked at states that had legalized cannabis and found that junk food sales in those areas had in fact increased after recreational use was legal.

The worry that this could add to the obesity epidemic if cannabis is legalized nationwide is a valid concern.

The U.S. Centers for Disease Control and Prevention (CDC) estimates that about 40 percent of adults in the United States are considered obese, and those rates are higher in areas where corner stores selling chips, cookies, and other unhealthy snacks are more common than those that sell fresh produce.

Legalization and snack sales

The study linking marijuana legalization and increased junk food sales was conducted by Michele Baggio, an assistant professor of economics at the University of Connecticut with a PhD in agricultural and resource economics, and Alberto Chong, PhD, a professor at Georgia State University’s Andrew Young School of Policy Studies.

Their work was published in the SSRN online repository (formerly Social Science Research Network).
They used monthly purchase data from the Nielsen Retail Scanner database that encompassed 2,000 counties in the United States and focused on cookies, chips, and ice cream from grocery, convenience, drug, and mass distribution stores.

Baggio and Chong compared the purchasing trends of those items when Colorado, Oregon, and Washington legalized recreational cannabis use.

Their analysis found legalization led to the following percentage increases: 3.1 for ice cream, 4.1 for cookies, and 5.3 for chips “immediately after recreational marijuana sales began.”

They also found that the increases in ice cream and chip purchases dipped down slightly in the months following legalization, but the increase for cookie purchases didn’t change.

“These might seem like small numbers,” Baggio said in a press release, “but they’re statistically significant and economically significant as well.”

They didn’t include the other states that have also legalized recreational cannabis — Alaska, California, Michigan, Vermont, Massachusetts, Maine, and even Washington, D.C. — because there wasn’t at least 18 months of purchasing data to consider.

But their research illustrates correlation, not causation.

In other words, it showed two things together but couldn’t demonstrate that one caused the other.

It doesn’t examine other grocery sales — namely healthier snacks like fruits and vegetables. It also doesn’t take into consideration many facts, including the added cannabis tourism states see after legalization that could contribute to the sales of cliche “stoner snacks.”

More people in the area immediately after legalization could help explain the increase in snack shopping because most people on vacation — whether they admit it or not — aren’t as health conscious as they are in their day-to-day lives, especially if they’re on a pot-infused holiday.

Tishler, who has backgrounds in health and cannabis, says other studies have shown that on average recreational users’ body mass index and fasting glucose levels — two indicators of metabolic health — are below non-using Americans.

“This clearly does not prove that cannabis will lead to obesity, but does serve to counterbalance the implication of this study that cannabis legalization would worsen the obesity epidemic in the U.S.,” he said.

In the press release announcing the findings of his research, Baggio says he initially wanted to see if there was a connection between legalization and obesity, but his research didn’t look at obesity rates, only trends that may appear in sales data.

“I’m not an advocate for legalization or not,” Baggio said. “I’m just interested in whether there are unintended consequences to the policy.”

We’ve known the munchies are real for a while

Nevertheless, the medical community has known that cannabis increases a person’s appetite since Johns Hopkins University researchers studied it and...
published their results in 1985.

In that study, nine men were closely watched as six were given “marijuana cigarettes” while three were given non-psychoactive cigarettes.

Researchers found those who got the cannabis did consume more calories overall, mostly by snacking in between meals.

The snacks those research subjects preferred were often more processed foods higher in salts and fats.

Dr. Mary Clifton, a medical internist in New York City who’s also licensed by the state to provide medical marijuana, says that in both rats and humans, the same thing happens when the cannabinoid receptors — or those that can affect appetite, pain sensation, and mood — are stimulated.

It’s called hedonic eating, and Clifton describes it as “the drive to eat to obtain pleasure in the absence of an energy deficit.”

But, she says, study after study has shown that many people who use cannabis report sleeping better or feel like they’re in a better mood.

“One thing Tishler found of the latest “munchies” study is that the highest percentage increase was for chips and cookies, both of which are crunchy foods.

“Munchies seem to increase desire, not just for food, but for crunchy foods in particular,” he said. “Hence, I advise my patients to have bags of baby carrots on hand, not Doritos.”

Healthy crunchier foods include other fruits and vegetables, which are often available pre-cut in party platters at your nearest grocery stores.

Hummus, lightly salted nuts, or the classic celery with low-sugar extra chunky peanut butter are healthy options as well.

But there are also other choices to consider when balancing your cannabis and caloric intake.

Clifton says if you’re trying to be more conscious of what you’re eating or trying to manage your weight, it’s better to stick to strains of cannabis with a lower amount of THC, as this can help stave off the munchies.

“Modifying your cannabis selection to a CBD prominent strain won’t release your inhibitions as much and won’t stimulate the appetite centers in the brain like THC will,” she said.

Are there healthier ways we can conquer the munchies?

While there currently isn’t a cure for the munchies, there are steps you can take to minimize its impact on your health.

The bottom line

Marijuana use can increase appetite — an effect more commonly known as “the munchies.”

Some researchers are concerned that
legalization of cannabis nationwide could increase the growing obesity crisis in the United States.

A recent study looked at states that had legalized cannabis and found that junk food sales in those areas had increased after recreational use was legal.

However, the study was limited in size and scope. Alaska, California, Michigan, Vermont, Massachusetts, and Maine, were not examined as part of the research because there wasn't at least 18 months of purchasing data to consider.

The study doesn't prove that cannabis use will lead to weight gain, but it does suggest that legalization of the drug may contribute to the obesity epidemic in the United States.

However, there are steps cannabis users can take to minimize the effects of the munchies, including substituting healthy snacks for unhealthy ones and choosing to use strains of cannabis with a lower amount of THC.