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THE SCIENCE OF **STRESS**

Manage It. Avoid It. Put It to Use.



SPECIAL **TIME** EDITION

THE SCIENCE OF **STRESS**



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FIGHT OR FLIGHT FOREVER

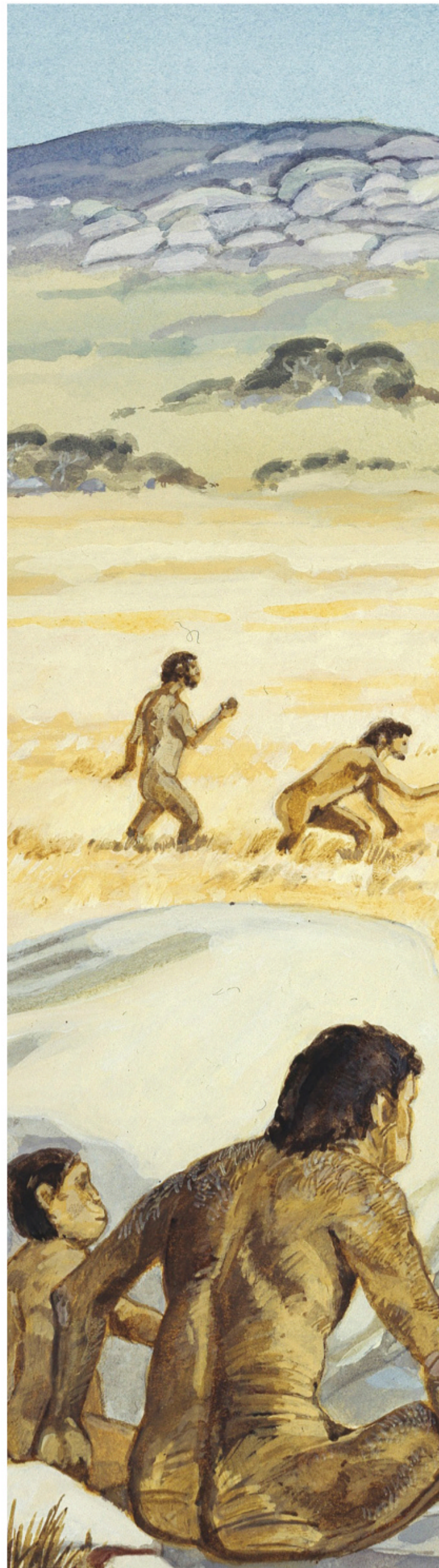
As we have evolved, so have the ways that we experience—and attempt to manage—the growing stress in our lives

BY JEFFREY KLUGER

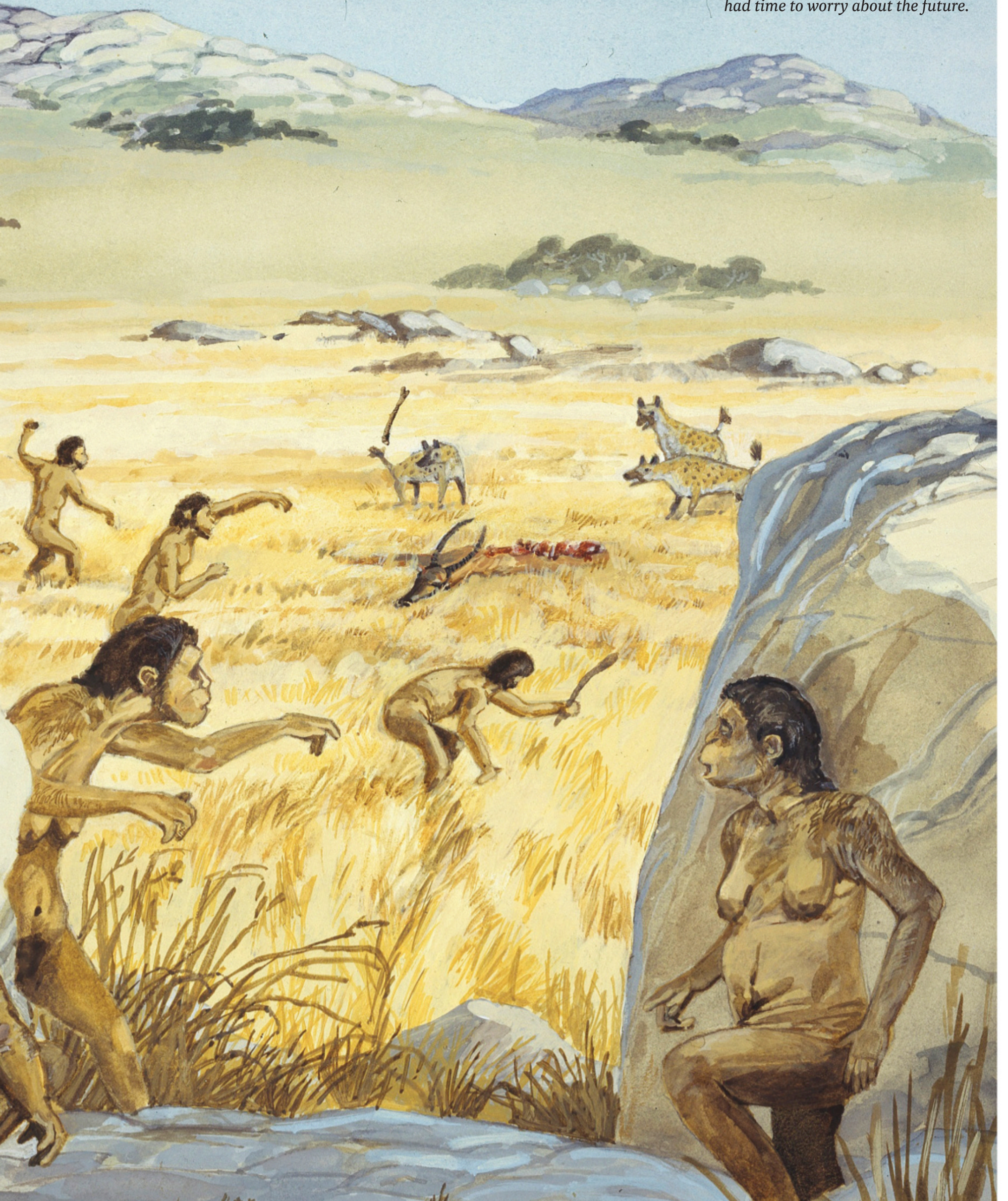


THE STAKES WERE A LOT SIMPLER A COUPLE OF million years ago when we were living on the savanna—uglier, yes, but simpler. There was the business of food, for one thing. You either ate or got eaten—and given that we were a slow, plump, flightless species with neither fangs nor claws, the getting-eaten part was a very real possibility. Injury and disease could get you too, and as often as not they did. In a world teeming with viruses and bacteria but with absolutely no human knowledge of sanitation, wound dressing or medical care, a broken leg, a bout of flu or even a mild infection from a simple cut could easily mean a nasty end. As for the whole primal reason for being alive in the first place—mating and breeding and producing little genetic copies of yourself—good luck keeping your hypothetical offspring alive in such an existential free-fire zone.

If there was anything that made this kind of binary, life-or-death environment survivable, it was that we were well equipped to han-



Our prehistoric ancestors—including Homo habilis, who lived roughly 1.4 to 2.6 million years ago in Africa—stressed over immediate concerns and rarely had time to worry about the future.



dle at least some of the dangers. When the lions leaped from behind a bush, our bodies responded, kick-starting a metabolic cascade that tensed our muscles, quickened our breathing, accelerated our hearts, shut down digestion (no use wasting calories processing your last meal when you might be about to become a predator's next one) and generally girded the system to fight. When the danger passed—if it passed—you returned to baseline.

As for spending a lot of energy fretting about the next time the same kind of peril might present itself? We didn't bother. The real needs of the moment trumped the prospective perils of the future. And with a brain that was less than half the size of modern human brains—not yet equipped with sophisticated problem-solving or planning skills—we wouldn't have been able to ruminate about the future even if we were inclined to try.

Things changed. We got smarter, more complex, much more creative; we left the raw danger of the savanna for the safer embrace of villages and towns and cities and nations. By now, ages later, we eat better, we live longer, we have many healthy children who grow up to have still more.

That doesn't mean that we face no dangers. They're just different, more subtle ones. And our big brains mean we're now constantly aware of them—able to dread them and plan for them and brood about them. Your *Homo habilis* ancestors did not have a mortgage, but you do. *Homo habilis* did not have a boss either—or deadlines to meet or marital woes or home repairs. And *Homo habilis* didn't spend time worrying about health concerns—like those headaches you've been getting, which might be nothing at all but could be something terrible and either way you have to live with the uncertainty because your doctor couldn't schedule you for an MRI until next month—an MRI that you just know is going to cost thousands of dollars and that your insurance won't cover because, well, it never does.

We don't have a lot in common with *Homo habilis* when it comes to threats except for this: our bodies react to them more or less the same way. That biological cascade—the hormones that send the body to battle stations with all of the metabolic urgency and tension that implies—has barely changed. Only, unlike *Homo habilis*, we almost never get the all clear. The lions that stalked our ancestors at least took a break. But the cycle of stressors modern humans face are ongoing—worse some days than others,

perhaps, but always present. And so too is the metabolic mess it makes of us, a permanent state of fight or flight that we have come to define by the simple label “stress.”

It's a good word, actually, one with a lot of applications. Buildings undergo stress; machines undergo stress; fault lines in the Earth's crust undergo stress. And all of them, at some point, can crack or collapse. The same is true of us.

In the U.S., 75% of adults report that they have experienced at least one stress symptom in the past month, and 35% of people report experiencing chronic work stress, according to the American Psychological Association. The National Institutes of Health estimates that at least 1 in 21 Americans reach that crack-and-collapse threshold in their lives, crossing over into full-blown panic attacks. The emotional beating that stress administers is matched by the physical. A constant state of high alert can contribute to serious health problems and disease: Type 2 diabetes, as the liver continually boosts sugar levels to give you the energy you need for the anticipated battle; high blood pressure and cardiovascular disease, as the heart and circulatory system spend too much time in overdrive; obesity, as the high levels of cortisol make you crave sugary, fatty foods; viruses and infectious diseases, as energy that would normally go to sustaining the immune system is diverted elsewhere. Fertility and libido plunge too. Who has time to think about breeding when you feel as if you're in a fight for your life? Insomnia, depression, headaches and even heartburn from all those never properly digested meals can combine to make a high-stress life an ongoing misery.

As the stress epidemic has grown over the generations, experts have done what they could to understand it and treat it. Hans Selye, a 20th-century Vienna-born endocrinologist, is seen as the architect of our modern understanding of stress, framing it as an adaptive response, but one that quickly moves from what he labeled the “alarm stage” (fight or flight), to the “resistance stage” (in which the body adapts to the ongoing stressor), to the “exhaustion stage,” in which the body is drained of all resources to manage the stressor and we simply break down.

Selye posited that the body's ideal state of equilibrium is maintained by balancing stress along two different axes. One is the eustress (or good stress) versus distress (or bad stress) axis—the



difference between the bracing, motivating tension you feel when you're preparing an important presentation and the corrosive tension you feel when you lie awake at night worrying about bills. On the other axis are hyperstress (the tightly wound tension that never goes away) and hypostress (an actual deficit of stress that makes it hard to bestir yourself to do the work that needs to be done). Balance both of those teeter-totters just so, and you can calibrate your stress levels perfectly. Nice—only Selye could never say quite how anyone was supposed to achieve that ideal.

Other investigators sought at least to measure and predict stress. In 1967, psychiatrists Thomas Holmes and Richard Rahe introduced the Social Readjustment Rating Scale (later called the Holmes and Rahe scale), which ranked 43 common stressors, from death of a spouse at the top, to changing career in the middle, to a minor violation of the law, such as a speeding ticket, at the bottom. Each was then assigned a score in “life change units” (100 for widowhood; 36 for the work switch; 10 for the ticket). The more life change units you accumulated in a year, the greater your risk of illness was. “The higher your score, the harder you have

75% OF AMERICANS

report having experienced moderate to high levels of stress within the past month.

to work to get back into a state of good health,” Selye wrote at the end of the test. The system had an appealing reductiveness to it—stress management as calorie counting—but was largely useless in practice.

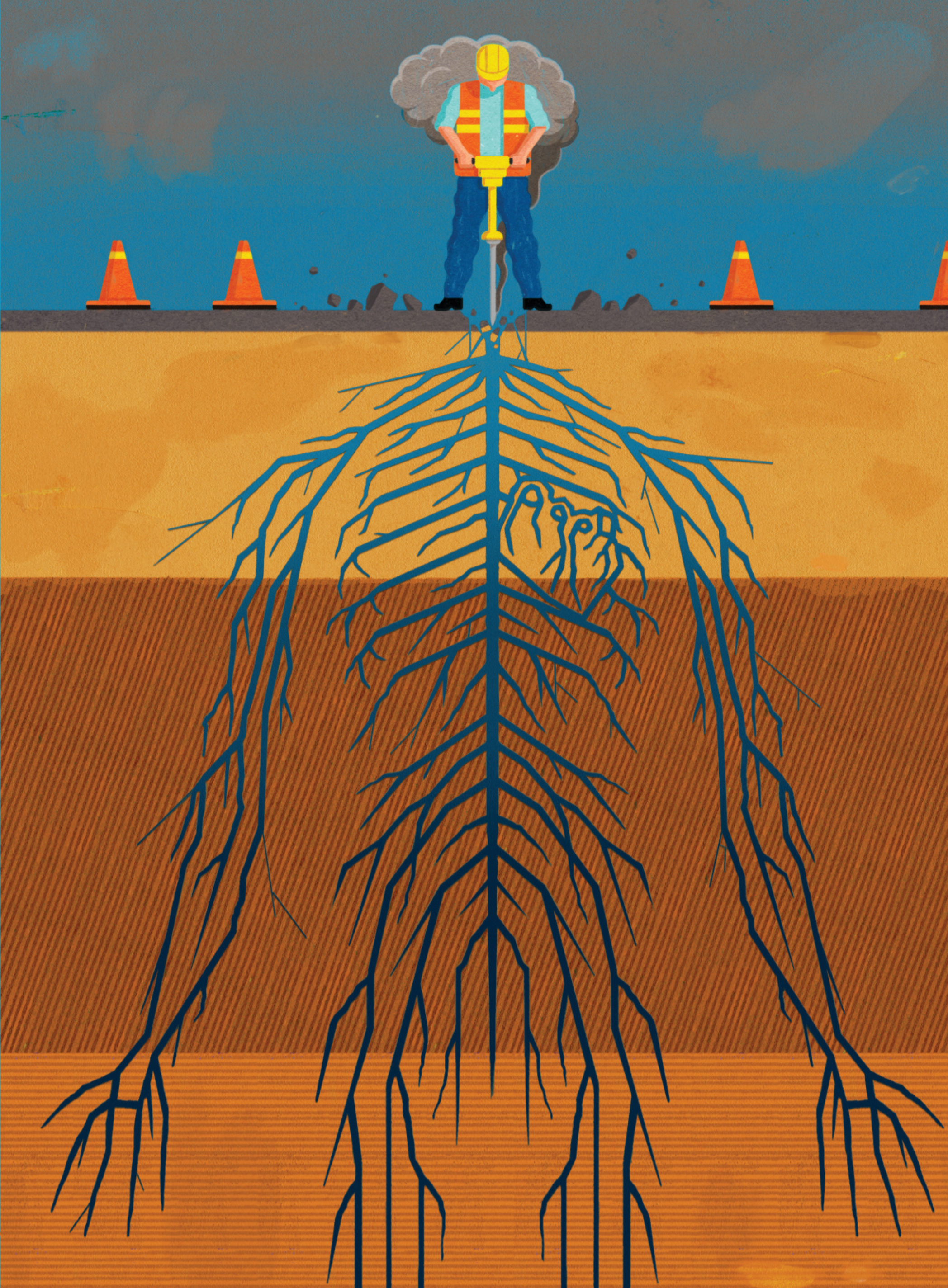
The truth is, we don't have a complete fix for stress today—the fight-or-flight system is simply embedded too deeply in the human genome to be decoded easily. But we do have palliatives—more and more of them: we know the power of exercise as a stress reducer; of building a social support net-

work; of diet as a route to overall wellness; of establishing unthreatening workplaces; of cognitive-behavioral therapy to reframe goals and stakes and dangers. We know as well of newly fashionable—and wonderfully powerful—approaches such as mindfulness and meditation and yoga. And, importantly, we know how to diagnose the physical signs of stress earlier and to intervene in time.

What we don't yet know, but can learn, is a means to embrace the good that Selye did recognize about stress: a species born on the savanna could never have made it off if it didn't know how to turn anxiety into initiative. To turn fretfulness into focus. There are ways to tame and master stress—and in so doing, to make sure it never masters us. □

CHAPTER ONE

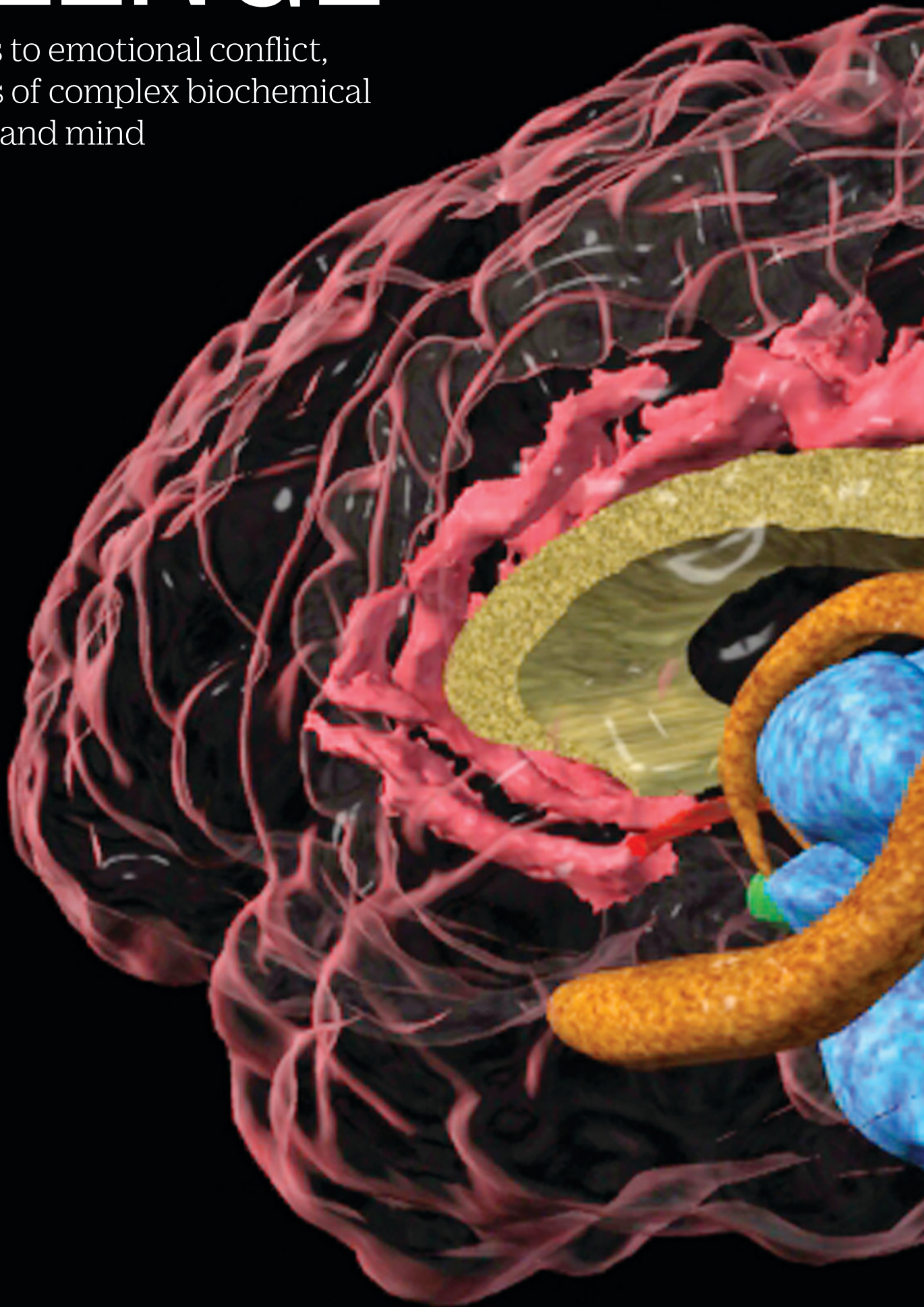
Defining Stress

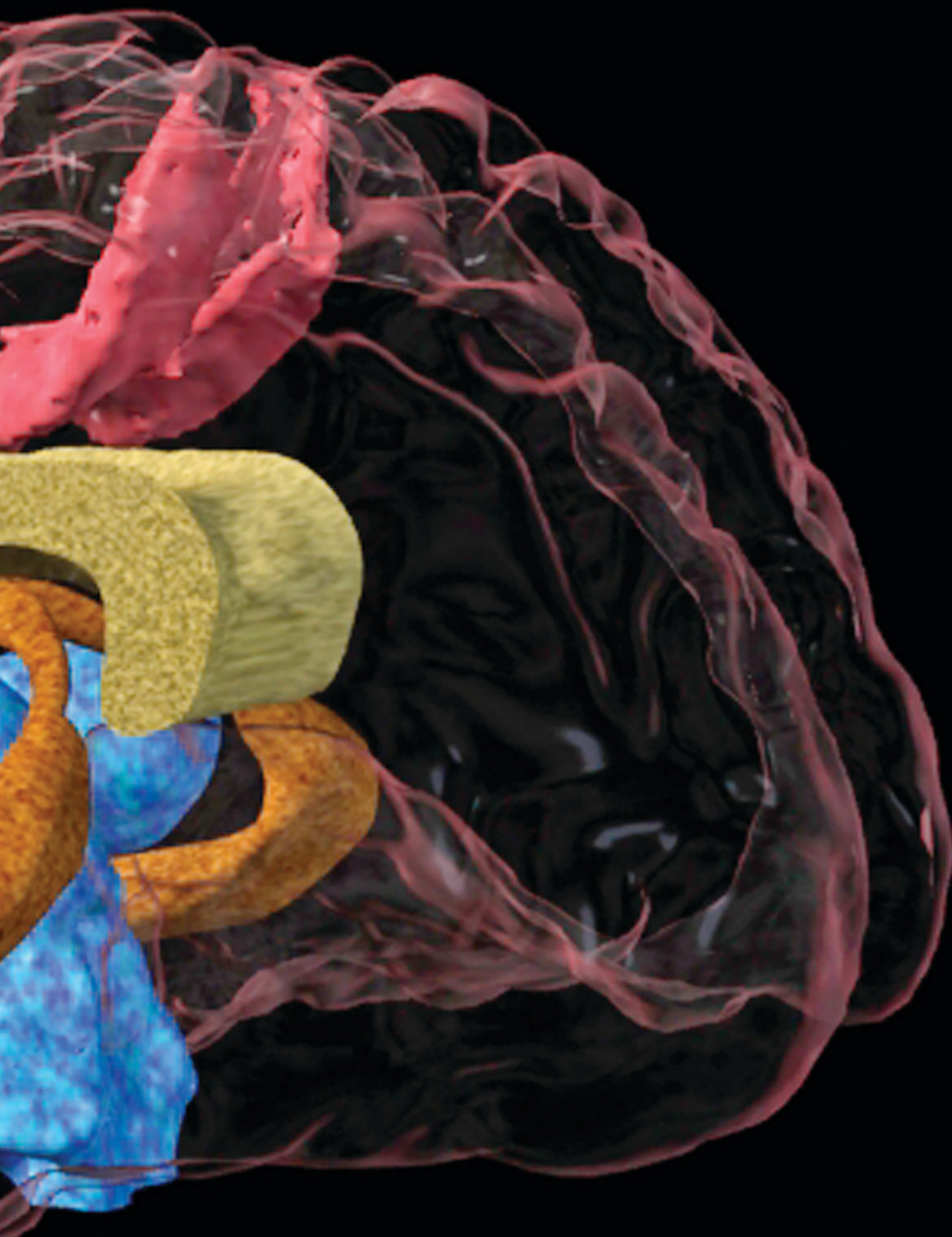


RISING TO THE CHALLENGE

From physical threats to emotional conflict, stress triggers a series of complex biochemical reactions in the body and mind

BY MARKHAM HEID





The stress response is activated in the limbic system of the brain (seen here via three-dimensional magnetic resonance imaging).

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BEGINNING IN THE 1930S, A McGill University fellow (later University of Montreal professor) named Hans Selye published a series of academic papers on stress and what he called the “general adaptation syndrome” of living organisms. Selye’s big idea, groundbreaking at the time, was that the human body’s “basic reaction” to any threat—be it physical or psychological—is more or less the same regardless of the threat’s source. Whether a person is being stalked by a mountain lion or by concern for a sick loved one, the same internal defense mechanisms kick into gear. These mechanisms involve “every vital organ and function,” Selye wrote, and any problems or “derailments” that arise in this process could cause or contribute to potentially grave health concerns.

Selye [see page 16] was a clear-eyed scientist, and he acknowledged that it would likely take generations for researchers to firmly grasp the intricacies and consequences of the human body’s response to stress. He wasn’t far off. Flash-forward to the present, and the latest research on stress bears out many of his theories.

“One of the biggest discoveries of the last 20 years is that stress can influence how the immune system operates and that the inflammation that results from stress plays a role in many different diseases and disorders,” says George Slavich, director of the Laboratory for Stress Assessment and Research at UCLA.

Inflammation is the immune system’s primary weapon against infection or injury. During periods of inflammation, the blood is infused with various enzymes and proteins that, in an attempt to heal wounds or rebuff invaders, can cause heat, pain or swelling. While short periods of stress and the inflammation it unleashes can exacerbate some pre-existing medical conditions, none of this seems to be harmful for healthy adults. In fact, a little stress can help people stay sharp and respond to a pressing challenge. But if stress lingers for long periods, its effects can have wide-ranging and sometimes disastrous consequences for a person’s mental and

physical health. From the function of the brain and heart to the activity of individual cells, there’s virtually no part of the body that stress doesn’t touch. Experts today are still revealing and refining the many roles stress plays in disease and dysfunction. But what they’ve learned to date can help people of all ages lead healthier, happier lives.

STRESS, DEFINED

STRESS, IN A NUTSHELL, IS ANYTHING A PERSON perceives to be a threat. The word “perceives” is important here because threat perception can vary widely from one person to the next, and it determines the intensity and duration of the body’s many stress-related reactions. “There can be a big difference between what you perceive and what threat actually exists, but the difference is arbitrary when it comes to the body’s response,” says Christopher Fagundes, an associate professor of psychology at Rice University in Texas whose research into stress and disease is funded by the National Institutes of Health. “Your body reacts to your perception of a threat—not to the reality.”

A simple way to illustrate this is to imagine two people locked in a room with a spider. One of the people has a terrible fear of spiders, while the other does not. The immediate threat to both of them is exactly the same. But their perceptions of that threat and their bodies’ reactions to it are quite different.

Perception is also important because, unlike pretty much every other living thing on Earth, people have the ability to predict a threat and prepare ahead of time for the harm it may inflict. “It turns out that the body starts to mount an immune response not just in response to an injury but in anticipation of an injury,” Slavich says. “And humans have the ability to manifest danger in their minds even when it’s not present.”

This is where anxiety comes into play. Although the terms “stress” and “anxiety” are often used interchangeably, they’re not quite the same. Stress is an external threat—such as a mountain lion standing in your path or a raging fire that forces you to flee your home. Stress is also the body’s reaction

Stress is anything we perceive to be a threat—but perception can vary widely from person to person.

to that external threat. Once the threat goes away, stress should go away.

Anxiety, on the other hand, is the internal alarm or concern that arises even when an external threat is not physically present. Anxiety is also the anticipation of a threat that never materializes. “The prototypical example is that you work for a nasty boss who is conflictual,” Slavich says. “You know you have a meeting with this boss at the end of the week, and your body has the ability to mount its immunologic stress response every day between now and Friday whenever you’re thinking about your boss.” Even if the meeting is canceled—meaning you’re never actually confronted with the source of your anxiety—you’ve still weathered the effects of stress.

It may seem odd that your body would react to the threat of a browbeating boss with the same systems that defend it from a physical attack. But Slavich says it makes a lot of sense when viewed through the lens of human history and evolution. “The brain and body developed the ability to scan their environment for social conflict or social isolation and to respond to these social dangers because, in the past, these often led to serious insult or injury,” he explains. Human beings who possessed a measure of anxiety and who were on guard for potential threats likely survived in greater numbers than their devil-may-care companions, and so passed on their anxiety genes to later generations.

Even today, a little anxiety can be beneficial. It can help you anticipate trouble and avoid it. But when anxiety and stress run rampant, many of the body’s core protective and restorative processes are disrupted. The results of that disruption can be dire.

THE BODY’S STRESS RESPONSE

STRESS BEGINS IN THE BRAIN. MORE SPECIFICALLY, it begins in the brain’s limbic system, which is home to the amygdala. While no part of the brain works independently, the amygdala is sometimes called the “emotional center.” One of its roles is to detect and assess potential threats and, if need be, notify the hypothalamus, which triggers the body’s fight-or-flight response. “The fight-or-flight response mobilizes our body to meet whatever immediate threat we’re dealing with,” says Darlene Kertes, an associate professor of psychology at the University of Florida, whose lab studies the effects of stress on health and human development.

That mobilization involves the hormone

epinephrine—also known as adrenaline—which floods the blood and initiates a number of short-lived physiological changes. Heart rate and sweating increase, and blood flows more freely to the limbs. The airways of the lungs expand to bolster breathing capacity, while the movement of food through the digestive system slows. Throughout the body, energy and other resources are temporarily reallocated in order to help it meet any physical trials.

While all this is going on, the cells of the immune system release pro-inflammatory chemicals called cytokines, Kertes says. Because inflammation works against injury and the spread of infection, this is part of the immune system’s way of gearing up for battle.

The fight-or-flight response also affects thinking and cognition. Stress can help you stay focused and block out distraction. But at the same time, your ability to multitask may be temporarily impaired. Research has also shown that during periods of high stress, some aspects of memory storage and recall take a hit while decision-making, for better or worse, speeds up.

Your ability to think critically also suffers. “The prefrontal cortex is the part of the brain that helps you use reasoning to guide your behavior,” Kertes says. When you’re experiencing strong emotions or urges, the prefrontal cortex can help keep those emotions and urges in check. “But under conditions of stress, we see less activity in this region, and people seem like they’re not acting rationally,” she explains. Raw emotion tends to take over, and this can lead to choices that seem helpful in the moment—throwing a punch, for example—but that have negative long-term consequences.

While short-term, adrenaline-driven stress responses are occurring, Kertes says, the hypothalamus also activates a second “stress system” to prepare the body for action. This second system is slower-acting but longer-lasting, she says, and it involves the hormone cortisol. “When we’re talking about the long-term effects of stress, we’re usually talking about the effects of excessive cortisol circulating in the body,” she explains. “When stress goes on too long or occurs very frequently, it’s this system that can negatively affect immune function, memory, fear and risk for disease.”

Cortisol is often talked about as a “stress hormone.” The body’s cortisol levels naturally rise and fall even in the absence of stress. “On a daily

basis, cortisol helps maintain the body's circadian rhythms, which regulate sleep and appetite, and it does other basic things with [cellular] growth and repair, with helping the glucose response and with amino acid production," Kertes says.

During periods of stress—either acute or prolonged—cortisol levels increase. Although cortisol is commonly associated with a rise in inflammation, its short-term function is actually to quell the surge in inflammation that stress has instigated, Kertes says. If a person is experiencing a bout of stress, this is exactly what tends to happen; cortisol floods the blood and calms down all those excited, inflammation-stoking immune cells.

But if stress persists and cortisol levels remain elevated for long periods, the body's immune cells and related systems become "desensitized" to cortisol's calming effects, Kertes explains. This desensitization can cause inflammation to rage out of control. It also blocks cortisol's typical "repair and maintenance" work, she says. Further, cortisol can bind to DNA and alter gene expression. That is one way excessive stress can affect how our organs and tissues are functioning, Kertes says.

While chronic stress leads the immune system to become desensitized to cortisol's helpful actions, the brain is becoming increasingly sensitized to stress. "If you're continually exposed to stress, you're teaching the brain that it exists in a toxic, threatening environment and that it needs to be on alert all the time," Kertes says. "So it becomes hyperresponsive." In other words, feeling anxious or stressed tends to breed more anxiety and stress.

Even brief bouts of stress can exacerbate existing health conditions. But chronic stress is a risk factor for a wide range of diseases and disorders. These include several types of cancer—including those of the breast and prostate—as well as Type 2 diabetes. They also include many conditions people don't tend to associate with stress, such as Alzheimer's disease, infectious diseases and pain disorders, Kertes says.

Heart disease is another health issue that research has tied to stress. "People who are chronically anxious or stressed are going to have more

inflammatory markers, more dysfunction of the endothelial lining of the blood vessels and overactivity of the sympathetic nervous system, which changes how the heart beats," says Christopher Celano, associate director of the Cardiac Psychiatry Research Program at Massachusetts General Hospital.

Some of the latest and most compelling research on stress has to do with its effects on the gut. "Stress can affect several aspects of normal gastrointestinal physiology—everything from influencing the secretion of gastric acid and other digestive enzymes to changing motility patterns both in the small and large intestines," says Michael Bailey, an associate professor of biosciences, microbial infection and immunity at Ohio State University's Wexner Medical Center. Bailey has studied the effects of stress on the gut and immune system. He says all these stress-induced shifts can worsen

symptoms for people with GI disorders, but they can also cause short-term stomach pain, constipation or other gut issues in healthy folks.

Stress can also change the composition of the gut's ecosystem of bacteria, which are collectively known as the microbiome. "During normal, healthy periods, the composition of the microbiome is pretty steady and consistent," Bailey

says. But during periods of stress, "the composition does change quite a bit," he adds. "In individuals with some bowel disorders—irritable bowel disease, in particular—we know stress can exacerbate these diseases, and it looks like that's associated with changes in the composition of the microbiota."

Bailey says prolonged periods of stress are the greatest concern when it comes to gut health. "Stress is a normal part of everyday life, so avoiding it is really not possible," he says. "What's important is making sure that stress response is acute and short-lasting, rather than something that festers for long periods of time."

"GOOD" AND "BAD" STRESS

BRIEF, MINOR BOUTS OF STRESS ARE SOMETIMES referred to as "good" stress because they can be motivating. This sort of stress can focus a person's attention and energies and thereby help him or her

When anxiety and stress run rampant, many of the body's core protective processes are disrupted.



complete a task—whether that task is studying for an exam or meeting a social or professional obligation. “And if you’re young and the stress is short-lived, it probably won’t have any lasting repercussions,” Fagundes says. But he says calling any stress “good” is a little misleading.

“Even short-term stress can be dangerous when you’re older,” Fagundes says. “It could induce a heart attack or stroke.” And for kids and young adults, brief bouts of stress may still provoke a spike in inflammation, he says. They can also disrupt sleep and trigger some GI symptoms.

That said, it’s the recurring, “chronic” bouts of stress that he and other experts say are the greatest threat to a person’s health. “A stressor that lasts for a couple months or longer is the type you really worry about,” he says. For young people, examples of chronic stressors could include having to deal with a volatile or abusive parent or grappling day in

and day out with social-media-related anxieties. For adults, work and family obligations are often daily sources of angst. Apart from sensitizing the brain and increasing its susceptibility to stress, these recurrent bouts of stress can cause immune-system overactivity, artery calcification and many other ill effects.

For all these reasons, learning to manage stress can be essential to maintaining good health. “Physical activity, meditation, breathing exercises and relaxation-response training—things people can teach themselves to help them relax—are all effective,” says Celano.

Laughter and spending time with close friends and family are also established stress-busters.

Almost a century has passed since medical researchers first began to grasp the immense and complex impact of stress on human health. That research has come a long way, but there’s still much to be discovered. □

Laughter and spending time with close friends and family are established stress-busters.

THE DOCTOR WHO CHANGED THE WAY WE THINK ABOUT STRESS

Hans Selye pioneered the study of stress and its effects, both negative and positive

BY LILY ROTHMAN

THESE DAYS, THE MEDICAL PROFESSION TAKES stress seriously—as countless studies on the effects of stress indicate it should. But that has not always been the case. Though human beings have always felt stress, it’s actually been less than a century since the subject began getting the attention it deserves.

As TIME explained in a 1983 cover story, it used to be thought that “stress” was just a vague feeling, not a term precise enough to have real medical usefulness. There was no firm definition or way of measuring it. Even so, it was clear that there was something going on. As early as the Civil War, a condition known as “soldier’s heart” was noticed by doctors. “During World War I, the crippling anxiety called shell shock was at first attributed to the vibrations from heavy artillery, which was believed to damage blood vessels in the brain,” as TIME put it. “This theory was abandoned by the time World War II came along, and the problem was renamed battle fatigue.”

What earlier doctors studying soldiers had missed was that the long-term activation of the famed fight-or-flight response could cause problems that would

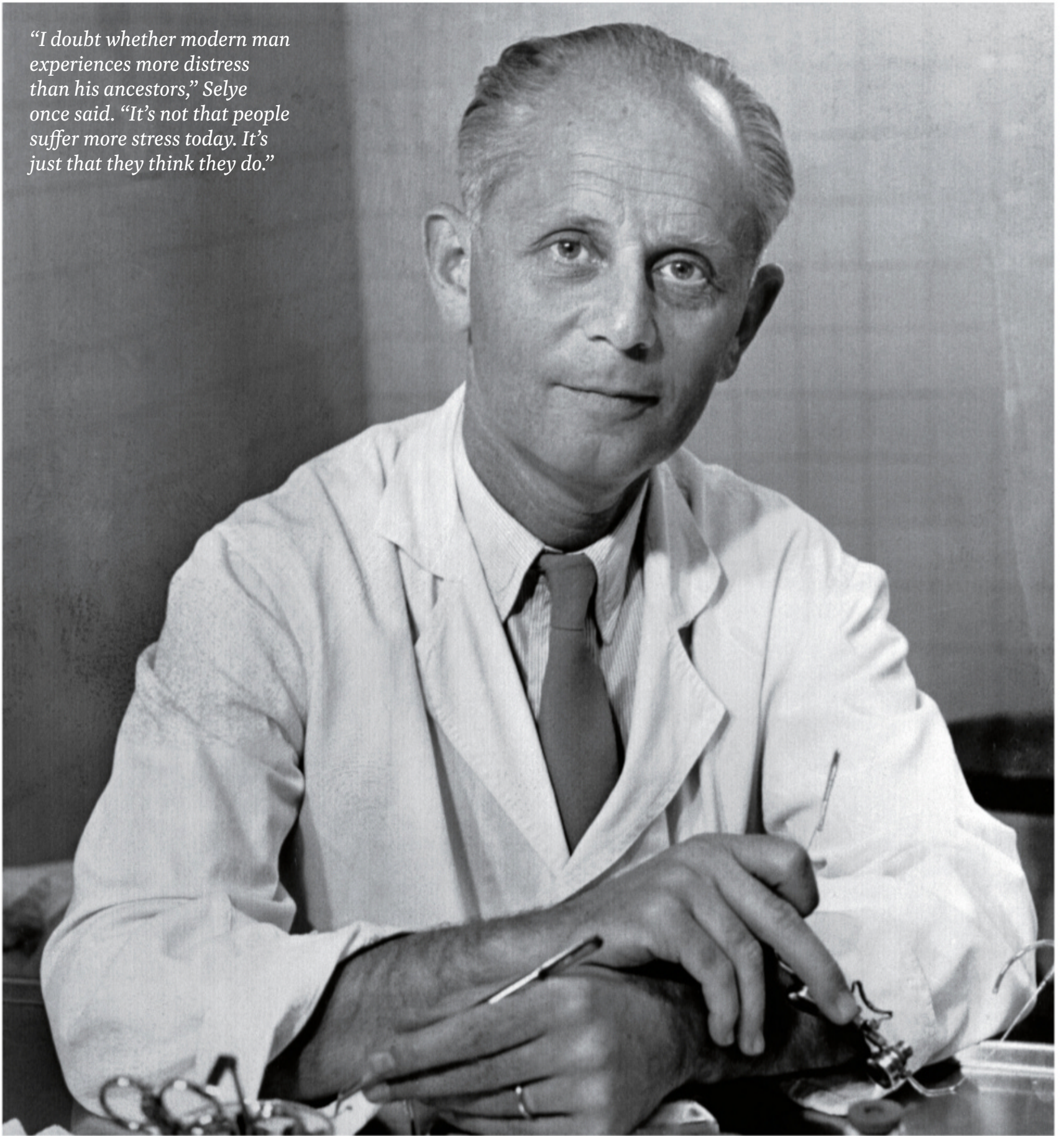
endure even in times of peace. That thinking began to change thanks in large part to Hans Selye, the “father of stress research.”

Selye was a medical researcher in Montreal studying hormonal changes in rats when, in the 1930s, he realized that something was going wrong in his experiments. He was trying to track the effects of an injection of a particular hormone, but it didn’t seem to matter what he stuck the rodents with. Yes, the rats showed signs of being affected (autopsies revealed that their adrenal glands were swollen, for example), but there was no way to link those changes to the specific hormones he was giving them. That’s when Selye—who had also noticed that some patients he’d seen as a medical student seemed simply “sick” in a way that wasn’t necessarily linked to a specific disease—had an important realization: the rodents he was studying were responding not merely to his injections of hormones and placebos but also to the stress caused by the experiment.

“His 1936 paper on stress, as the cause of death in his experimental rats, attracted no more attention than Alexander Fleming’s first report of penicillin—and it may prove no less important to suffering mankind,” TIME noted in 1950, by which point his continuing work had earned him renown in the field. Selye theorized that overexposing the body to stress would cause what he called “general adaptation syndrome.” The idea was that the body would respond to a lasting stress the same way it would to a brief shock, but when the shock didn’t dissipate, the body would become inured to its cause. Though that might seem advantageous for daily life, it took its toll; when a new, different shock came around, the body would be less able to summon the necessary reaction. The eventual result was exhaustion and related medical conditions, such as high blood pressure. Far from being limited to soldiers, the range of potential sufferers included all of humanity.

At that time, Selye was known to his colleagues, but his discoveries had yet to trickle down to patients. Still, he said he believed that a “whole new branch of medicine [was] opening up” and that stress would get the specialized attention it deserved. Sure enough, as the decade progressed, stress-related diseases were increasingly the subject of concern and study. Researchers dedicated themselves to learning how exactly stress worked and, while attempting to find medical treatments for its causes and effects, began to recommend leisure to their patients as a self-help

“I doubt whether modern man experiences more distress than his ancestors,” Selye once said. “It’s not that people suffer more stress today. It’s just that they think they do.”



solution. Stress research would go far beyond Selye’s own discoveries (and he would, posthumously, draw criticism for his relationship with the tobacco industry), but he is still considered a towering figure.

And Selye’s research also uncovered something that may surprise—or perhaps comfort—the stressed among us, and that’s a takeaway that has largely endured even as research on the subject has evolved. Though we use the term “stress” almost exclusively in a negative sense, his 1956 book, *The Stress of Life*, and its 1974 follow-up, *Stress Without Distress*, made the case that while stress could shorten our lives and decrease their quality, not only was it impossible to

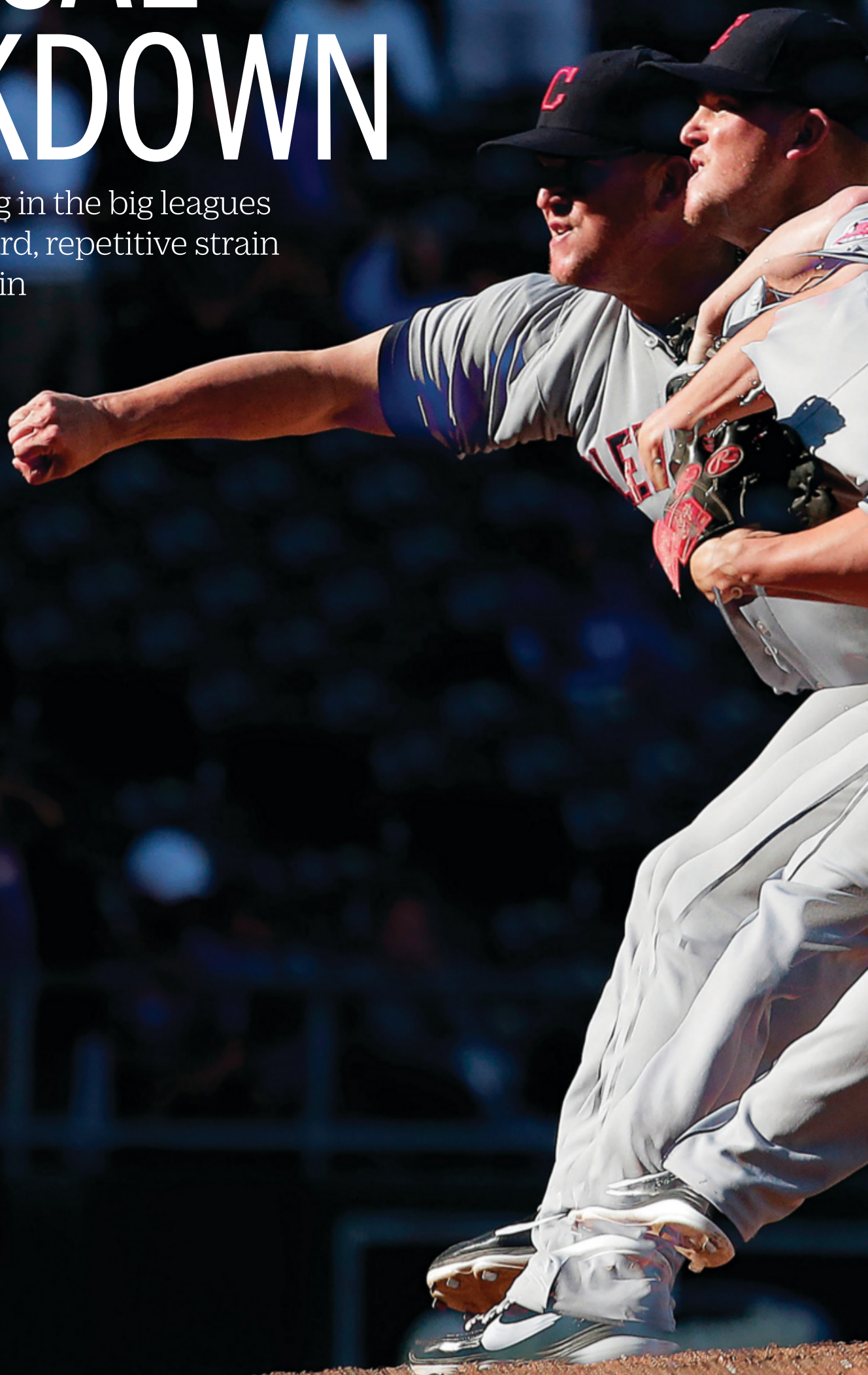
live without stress but you wouldn’t want to anyway. “Crossing a busy intersection, exposure to a draft, or even sheer joy are enough to activate the body’s stress mechanism to some extent,” he wrote. “Stress is not even necessarily bad for you; it is also the spice of life, for any emotion, any activity causes stress. But, of course, your system must be prepared to take it.” Life, he added, “is largely a process of adaptation to the circumstances in which we exist.”

So how to strike the right balance? Selye, who died in 1982, offered this advice: “Fight always for the highest attainable aim, but never put up resistance in vain.” □

PHYSICAL BREAKDOWN

Whether you're pitching in the big leagues or glued to your keyboard, repetitive strain injuries can be a real pain

BY RICHARD JEROME





To avoid the injuries that can result from the intense throwing motion, most Major League Baseball starting pitchers (like the now-retired Vinnie Pestano, above) are relieved after about 100 pitches per game.



IN THE SUMMER OF 1974, Tommy John of the Los Angeles Dodgers was one of the finest pitchers in baseball. The 31-year-old lefty specialized in the sinker, a pitch designed to induce ground balls that could be scooped up by the defensively adroit L.A. infield. Midway through the '74 campaign, John appeared to be headed for the best season of his 12-year career, with a stellar 13–3 record and major-league-leading .813 winning percentage. Then disaster struck: in baseball parlance, John's arm went "dead"; attempting to throw brought excruciating pain. As it turned out, the stress of having delivered thousands of pitches since his boyhood in Terre Haute, Ind., had permanently damaged the ulnar collateral ligament of John's elbow. It was the same injury that in 1966 had forced Dodgers great Sandy Koufax, the era's most dominant pitcher, to retire at the height of his powers.

John, however, had one long-shot option Koufax was denied: a revolutionary new operation, performed by noted orthopedic surgeon Frank Jobe, in which the damaged ligament was removed and replaced by a tendon taken from his right (non-pitching) forearm. Surgery notwithstanding, many assumed John would never pitch again. But after a year's layoff he came back to stay . . . and stay. John pitched another 14 seasons, until age 46, and enjoyed some of his best years, logging 164 of his lifetime 288 victories. More than four decades later, the career-saving procedure—known ever since as "Tommy John surgery"—is fairly routine; one quarter of major-league pitchers have undergone the operation, which has an 80% success rate.

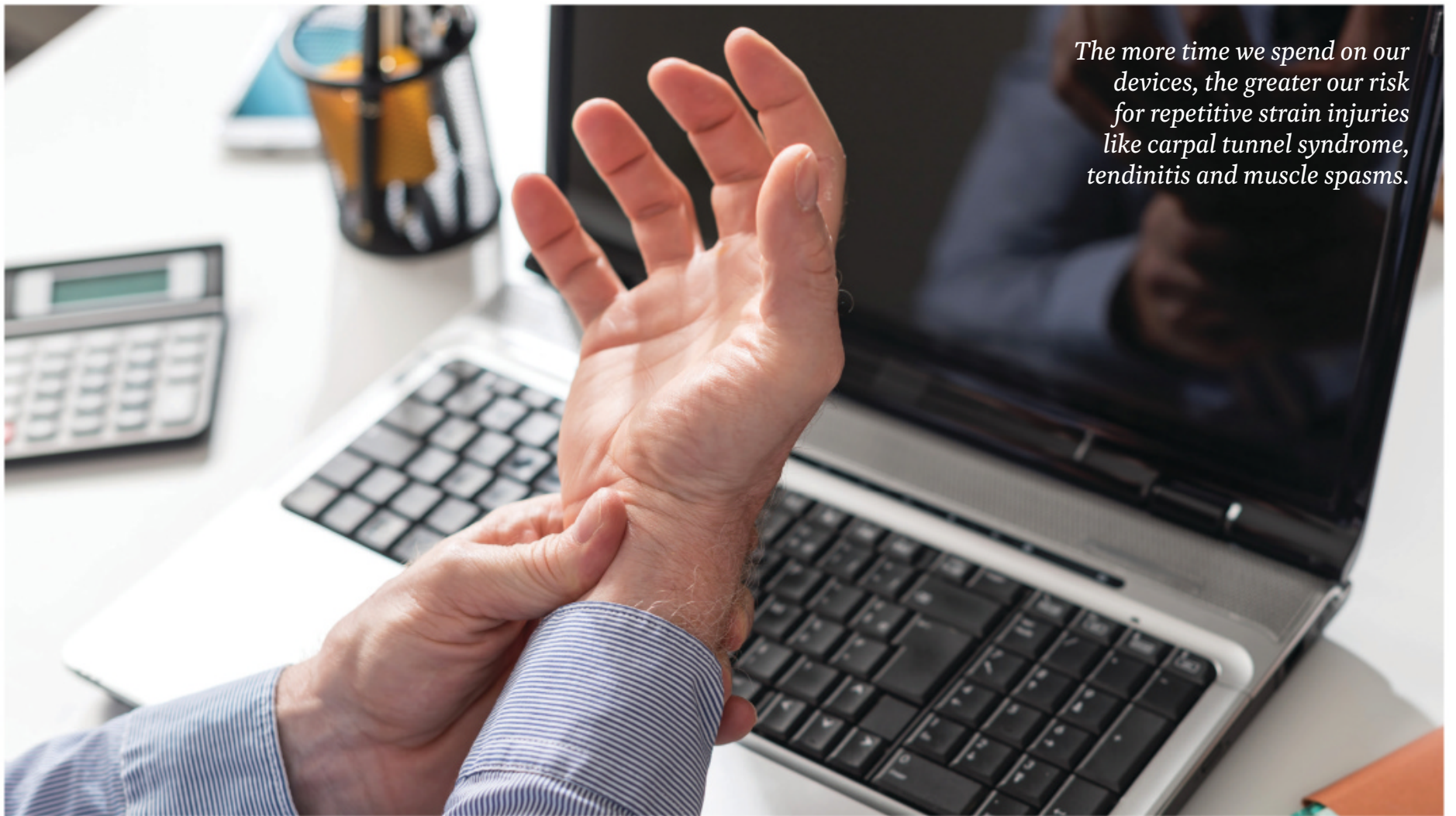
If the surgery is commonplace, so is the precipitating injury. Damage to the ulnar collateral ligament is a classic consequence of excessive physical stress—more specifically, repetitive stress, caused by performing the same action over and over again. Repetitive motion is the culprit in 50% of all athletic injuries, be it from throwing, running, jumping or swinging a club or racquet. But it's also a hazard of everyday tasks, such as scrubbing floors or manipulating a computer mouse or smartphone for hours on end. Whatever the activity, this kind of overuse throws off the complex anatomical choreography that allows for human motion. "Your body is made up of muscles, tendons, ligaments and bones," explains biomechanics expert Glenn Fleisig of the Uni-

versity of Alabama at Birmingham, research director of the school's American Sports Medicine Institute. "When someone moves, whether they're running, throwing or swimming, the brain tells the muscles what to do. The muscles move; the bones and the ligaments and tendons keep things connected. That connective tissue is usually the weak link. Every time you work out in the weight room or ride your bike for five miles or throw 100 throws, you're getting stress and getting microscopic tears in the muscles, tendons and ligaments.

"Stress, mathematically, is force divided by the area," Fleisig adds. "Force per area is how hard you're pulling that tendon or ligament divided by its cross-sectional area. So you have big muscles exerting force and they're connected to these skinny little ligaments and tendons, which have a smaller area and will suffer more stress. In repetitive stress, throw after throw or step after step, your muscles and tendons stretch, and each time they do, you get little tears in them."

How much stress does pitching exert on a hurler's arm? Using a high-speed, three-dimensional automated motion analysis system, Fleisig and noted sports surgeon James Andrews computed the stress on key elbow and shoulder joints during the act of pitching. When the arm is cocked back, for instance, the stress on a pitcher's elbow is 100 Newton meters. "That's the equivalent of having five 12-pound bowling balls pulling down on your arm," explains Fleisig. "Unlike a car or other mechanical system, we're all living creatures, so we may get these little tears—but then when we rest or sleep, our body repairs itself." It's crucial that the body has sufficient recovery time. When a pitcher throws 100 pitches in a game and then rests for a few days, the body heals its tears. But if he rushes back to the mound too soon, that's when trouble starts. "The second time out, the stress and tears build upon the previous time's," Fleisig says. "The little tears keep building up faster than they repair. Then you get a big tear and you have an injury."

That is precisely what's been happening to pitchers in recent years—at all levels. Indeed, almost 60% of Tommy John surgeries now are performed on athletes between the ages of 15 and 19. Why? Fleisig, a member of the Major League Baseball Elbow Task Force, a research group established to probe this epidemic, has studied thousands of young pitchers and attributes much of the problem to a recent emphasis on specialization. Traditionally, kids played different sports according to the seasons. Now, promising



The more time we spend on our devices, the greater our risk for repetitive strain injuries like carpal tunnel syndrome, tendinitis and muscle spasms.

athletes are often encouraged to zero in on one sport all year. Compounding the problem is a fixation on the radar gun, which measures how fast a pitch travels. “It used to be that the pitcher who had the best stats was promoted,” Fleisig says. “Now the focus is on who has the best speed. So kids throw as hard as possible. This max effort, plus doing it year-round, are the two factors leading to injuries.” Tommy John himself bemoaned the trend in a recent article for AARP. “This is about more than just baseball and elbows. It’s about the way we’re raising our children. The nation’s youth-sports industry is a \$15 billion business,” wrote John, now 76. “And kids’ bodies are paying the price . . . If a child is spending more than eight months annually in one sport, he or she is nearly three times more likely to experience an overuse injury in their hip or knee.”

OF COURSE, THE stress of repetitive motion is a problem that extends far beyond the baseball diamond—indeed, it pervades pretty much every human activity. Running is one of the most obvious. In jogging a mile, for instance, we take about 1,200 steps, each one pounding the surface with a force nearly triple our body weight. “With running, you get two types of injury,” Fleisig says. “One is something like shin splints—also common among dancers—from tension on the tendons. But when you get an injury to the meniscus—cartilage in the knee—or a bone injury [such as a stress fracture], that’s from compression”:

the impact of the foot hitting the ground.

In the most extreme cases—say, a 26.2-mile marathon—running can subject the rest of the body to punishing stress. A 2017 Yale University study found that 82% of post-marathon runners developed stage 1 acute kidney injury (an inability to filter waste due to elevated levels of creatinine, a chemical waste product). Although the kidneys recovered within two days, researchers stated that the cause may be the sustained rise in core body temperature, dehydration or decreased blood flow to the kidneys that occur during a marathon. Additionally, 73% had urine sediments and other injury and repair biomarkers, indicating structural kidney damage. Other effects of marathoning include perilously low levels of sodium. Often marathoners see their urine darken post-race. That’s usually a by-product of muscle breakdown: muscles stressed to extreme levels release myoglobin, an oxygen-bearing chemical that tints urine dark brown en route through the bladder. If this all sounds a bit scary, the good news is that marathon running can actually, in the long term, make you healthier—so long as you’ve built up to it slowly. Marathons are “a massive physical challenge,” sports scientist Mark Lake of John Moores University in Liverpool, England, told the BBC. “You’d want to get someone to gradually train for it over a period of months so the body has the chance to adapt.”

As many of us know firsthand, you don’t need to be a jock to suffer the effects of repeated physical stress.

Today such injuries are commonly associated with computer work—the sting and ache of carpal tunnel syndrome, a nerve compression around the wrist, or tendinitis, an inflamed tendon. (I once had it so bad, from my right biceps up to the shoulder, that the office techies had to swap my mouse for a trackball.) But repetitive strain injury (RSI) in the workplace is hardly a recent phenomenon. As early as the 17th century, medical journals reported a painful condition known as “milkmaid’s arm.” The first in-depth study of occupational RSI was *De Morbis Artificum Diatriba* (Latin for *Diseases of Workers*), published in 1700 by the Italian physician Bernardino Ramazzini. This was a detailed catalog of jobs and trades that called for repetitive motion—as well as the flip side, long sedentary periods spent in the same position. As Ramazzini put it, his subject was “workers in whom certain morbid afflictions gradually arise from . . . some particular posture of the limbs or unnatural movements of the body . . . workers who all day long stand or sit or are bent double; who run or ride or exercise their bodies in all sorts of ways.”

Clerks, Ramazzini noted, face occupational hazards such as constant sitting and “incessant movement of the hand and always in the same direction. Incessant driving of pen over paper causes intense fatigue of the hand and the whole arm because of continuous and almost tonic strain on the muscles and tendons which in the course of time results in failure of power in the right hand.” (He did not allow for southpaws.) Moreover, Ramazzini pointed out that “chair workers” like cobblers and tailors “become

bent, hump-backed, and hold their heads down like people looking for something on the ground.” Their hunched posture pulls apart their “outermost vertebral ligaments,” making it impossible to straighten out. Meanwhile, he wrote, bakers “all become bow-legged” because of the way they sit all day while rolling dough.

In the U. S., not surprisingly, it was blue-collar laborers and other working stiff who bore the burdens of repetitive motion. The earliest American cases of RSI were reported in 1912, when telegraph operators started complaining of a condition that came to be known as “telegraphists’ cramp.” During World War I, Morse Code operators suffered a painful syndrome dubbed “glass arm.” Repetitive motion ailments struck all manner of proletarian occupations—seamstresses, meat packers and construction and assembly-line workers. Indeed, the bulk of RSI or “cumulative trauma” cases reported to the Bureau of Labor Statistics came from the manufacturing sector.

That profile has changed over the past 25 years with the ascendance of computers, both in the office and at home. Society’s ever-increasing reliance on technological devices has given rise to an entire class of repetitive stress injuries, some with branded nicknames like BlackBerry thumb, iPod finger and Emacs pinky. Other recent handheld hazards include (Rubik’s) Cuber’s thumb and raver’s wrist, which the online Free Dictionary hiply defines as “a post-modern repetitive stress injury caused by repeated rotation of the hands for many hours—e.g., while holding glowsticks during a rave.”

SOME COMMON STRESS INJURIES

According to the National Institute of Neurological Disorders and Stroke, repetitive stress disorders “are a family of muscular conditions that result from repeated motions performed in the course of normal work or daily activities.” These conditions most commonly afflict the hands, wrists, elbows and shoulders, but they can also happen in the neck, back, hips, knees, feet, legs and ankles. The injuries can be characterized

by pain, tingling, numbness, swelling or loss of flexibility and strength; they derive from uninterrupted repetitive action or motions, overexertion, poor posture and fatigued muscles. Stress injuries come in a variety of forms. Here are a few:

Bursitis: Inflammation and swelling of the fluid-filled sac near a knee, elbow or shoulder joint.

Carpal tunnel syndrome: Painful compression of the median nerve across the inner wrist. It’s very common among computer users and athletes—say, gymnasts who do handstands.

De Quervain’s syndrome: A painful inflammation of tendons on the thumb side of the wrist, often associated with overuse of the wrist.

Dupuytren’s contracture: A thickening of deep tissue in the palm of the hand and fingers that can lead to permanently bent fingers. Using vibrating tools increases the risk.

Intersection syndrome: Painful inflammation of certain forearm muscles, caused by repeated flexion and extension of the wrist. Common among weight lifters, rowers, racquet-sport players, horseback riders and skiers.

An interesting confluence of repetitive stressors formed the basis of a study of elite youth baseball players in Japan, published last year in the *Journal of Shoulder and Elbow Surgery*. Researchers from Tohoku University School of Medicine followed 200 boys between ages 9 and 12 at a national tournament and found a relationship between extensive video-game play and pain in the elbow and shoulder; players who spent three or more hours a day on video games over the previous year were 5.6 times as likely to have felt elbow or shoulder discomfort as were kids who spent less than an hour daily at the video screen. Gaming has become increasingly popular in big-league clubhouses, particularly among starting pitchers, who have several idle days between their turns on the hill. When Boston Red Sox ace David Price came down with a case of carpal tunnel syndrome last year, some blamed his enthusiasm for the war-themed video game *Fortnite*. (Price—who is midway through a seven-year, \$217 million contract—denied the connection, noting that he’s been an avid gamer for two decades.)

In all cases of repetitive stress, whatever their origin, an obvious and elegantly simple preventive measure is to refrain from overuse. Today, amateur baseball teams are confining pitchers to strict pitcher-per-game counts, thanks in large part to studies by Fleisig, Andrews and colleagues. On the website pitchsmart.org, researchers have compiled a detailed chart with optimal pitch-count guidelines and recommended rest periods at various ages from childhood through college. For example, an 11-year-old

with one day’s rest between outings should throw no more than 35 pitches; on three days’ rest, that maximum nearly doubles, to 65. For major leaguers, most teams set an informal pitch limit between 100 and 115. Indeed, it’s rare today to see pitchers throw full nine-inning games, once de rigueur for topflight starters—in 1974, the year of Tommy John’s surgery, Hall of Famer Ferguson Jenkins notched the most complete games, with 29. In 2018, by contrast, seven hurlers tied for the lead with a grand total of two.

Along with downtime, Fleisig emphasizes proper form. “You want to optimize your mechanics by using your whole body and reduce the force and stress on your arm,” he says. It’s a principle that applies to any sport or occupation. For us computer jockeys, the science of ergonomics—designing a workplace for optimum comfort, injury avoidance and efficiency—has flourished. Elements of posture, desk layout and chair and screen alignment come into play, as well as recommendations on how to grip a mouse (not too tightly), using keyboard shortcuts, how to hold your wrist (avoid bending it) and other suggestions. Rest and exercise are paramount—pry your eyes away from the screen periodically, and make sure to get up and take a stroll from time to time.

“Rest, recovery and varying the stress can reduce the risk of repetitive stress injury,” advises Fleisig. “Most importantly, each person should listen to their body. When fatigued, stop the activity and rest and recover; when there is pain, seek a medical evaluation to address the issue before it becomes serious.” □

Lateral epicondylitis, or tennis elbow: Affects the outer part of the elbow after repetitive wrist and arm movements—found not only in tennis players but also in plumbers, painters, carpenters and butchers.

Medial epicondylitis, or golfer’s elbow: Affects the inside of the lower arm, near the elbow. Frequent playing of certain sports or repetitive twisting motions can lead to this condition.

Raynaud’s disease: Blood vessels in the extremities constrict when they’re cold or stressed. One trigger is work requiring vibration, such as using a jackhammer.

Radial tunnel syndrome: A dull ache is felt at the top of the forearm. Too much pushing or pulling or overuse of the hand and wrist can painfully irritate the nerve.

Rotator cuff syndrome: Damage to any of the tendons that hold the shoulder joint in place. Common in work that involves prolonged overhead activity.

Tendinosis: Overuse causes degeneration of collagen—the main structural protein of the body’s connective tissues—within the tendons.

Tendinitis: An inflamed tendon.

Thoracic outlet syndrome: Blood vessels or nerves become trapped between the collarbone and the first rib. This malady often afflicts people who use their upper extremities to haul heavy weights.

Stenosing tenosynovitis, or trigger finger: A finger becomes stuck in the bent position; this condition is also known as “texting tendinitis.” Can result from repeated, strong gripping.

Writer’s cramp: Muscle spasm in overused hands and arms.

CAN ANXIETY CAUSE HIGH BLOOD PRESSURE?

Experts are still figuring out the relationship between chronic worrying and hypertension

BY MARKHAM HEID

ANXIETY IS PART OF LIFE. YOU FEEL IT WHEN you're stuck in traffic, harried at work or worrying about your family and finances. There's no doubt that feeling anxious can elevate your blood pressure, at least in the short term.

"Our mind and our thoughts certainly are connected to our hearts," says Christopher Celano, associate director of the Cardiac Psychiatry Research Program at Massachusetts General Hospital. When something makes you anxious—whether it's a life-threatening emergency or a persistent worry—your sympathetic nervous system initiates a fight-or-flight response that raises your heart rate and blood pressure, Celano explains.

This is fine—and sometimes even beneficial—in moderation. "A little anxiety can be motivating," he says. It can help you start a new exercise routine or make healthier food choices. But action in the nervous system needs to be balanced out by activity in the parasympathetic nervous system, which slows down heart rate and increases digestion. (Unlike the "fight or flight" response, this one is nicknamed for its ability to help the body "rest and digest.") "The parasympathetic nervous system helps you relax, and a balance between the parasympathetic and sympathetic nervous systems is essential for heart health," Celano says.

Some people with anxiety don't have that bal-

ance, and over time this could imperil the heart. As Celano says: "When people are chronically anxious, they may experience changes to their immune system, blood vessels and platelets that may contribute to heart disease."

Research bears this out. A 2015 research review published in the journal *Neuropsychiatric Disease and Treatment* found that people who experience high levels of anxiety are more likely to develop hypertension than those who aren't as anxious. One of the studies found that if a person's anxiety levels are elevated for long periods, the resulting nervous-system activity could raise blood pressure



and promote arterial disease. But a lot of the evidence was inconsistent or inconclusive, the authors pointed out. Some contradictory research has even found that anxiety is associated with a slightly lower risk of hypertension.

The tricky part of this research is establishing an unambiguous cause-and-effect relationship between anxiety and high blood pressure, says James Brian Byrd, a hypertension specialist and an assistant professor of cardiovascular medicine at the University of Michigan Medical School. Ask someone to deliver an impromptu public speech, and their heart rate will almost surely shoot up, Byrd says. “However, it

is harder to tell whether frequent anxiety can contribute to the development of sustained hypertension,” he says. “The issue is not settled.”

Still, the links between chronic anxiety and higher rates of hypertension and heart problems are worth taking seriously. “People who have anxiety all the time and worry about a lot of different things—those are probably people who are going to be more at risk for heart disease and hypertension in the long run,” says Celano.

One of Celano’s studies, published in the *American Heart Journal*, showed that among people with heart disease, anxiety is associated with increased mortality. Although that doesn’t prove that anxiety earlier in life caused or contributed to their heart problems—in fact, the researchers found that depression, which often accompanies anxiety, was more strongly linked to mortality—Celano says it makes sense that constant worrying would, over time, promote heart and blood pressure issues.

How can you tell if your anxiety is the type that could hurt your heart in the long run? That can be difficult. Doctors and clinicians tend to use lengthy questionnaires, such as the State-Trait Anxiety Inventory (STAI). The STAI asks people to rate, on a scale from “almost never” to “almost always,” whether they’re feeling calm, secure, tense, strained, frightened and more—with 40 measures in total.

Celano offers more straightforward criteria. “Try to distinguish whether or not the anxiety is so severe that it’s impacting [your] life or functioning,” he says. If you feel like you worry too much about a variety of things on most days and this anxiety is messing with your sleep or mood or relationships, then that’s the type of anxiety that could lead to hypertension and heart trouble.

“Talk with a physician or other provider about it,” he advises. There are a number of ways to deal with it, from mind-body approaches like meditation and relaxation response training to medication, he says. Lifestyle changes—including exercising, sleeping well, eating a healthy diet and cutting caffeine—can also help ease anxiety for some people.

Even if anxiety by itself doesn’t contribute to heart disease, keeping your worrying in check is still important. “Irrespective of whether chronic anxiety contributes to hypertension, managing anxiety and stress is an important aspect of maintaining a high quality of life,” Byrd says. A steady state of high anxiety isn’t something you should ignore. □



THE ANIMAL EXPERIENCE

Anxiety isn't just a human emotion. Wolves, whales and our beloved pets all experience stress

BY COURTNEY MIFSUD





After a deliberate effort to eradicate the Oregon gray wolves in the 1940s, the state is now dedicated to reversing that campaign and rebuilding the population. In 2018 there were as few as 137 wolves estimated in the state.



WHEN FEDERAL RESEARCHERS fitted a gray wolf in Oregon with a radio-tracking collar, they intended to report only on the wolf's movements. A little more than a month after tracking began in the state's

Mount Hood region, the signal went still. No one can say for sure why the wolf died. It had not been shot or poisoned. A necropsy done by the Oregon State University Veterinary Diagnostic Lab found no evidence of foul play. According to U.S. Fish and Wildlife Service biologist John Stephenson, while several things could have gone wrong for the wolf, such as a paw injury that could have prevented it from finding food, capture-related stress from the radio-tracking collaring cannot be ruled out as the possible killer. Capture myopathy is a condition of animals in which overworked skeletal muscles (the ones that fuel the fight-or-flight response to being caught) start to break down and release a protein that, in large amounts, can result in death.

In this context, stress is generally defined as the physiological response to a stimulus (environmental or psychological) that an individual (or animal) perceives to be a threat. The stress response involves the buildup of cortisol hormones and adrenaline, which increases heart rate and blood pressure and even suppresses the immune system. When it's chronic, stress can be lethal, but stress also keeps animals safe.

"The stress response is about preparing the body for a major expenditure of energy," wrote Robert M. Sapolsky, a neuroendocrinologist at Stanford University, in his seminal text *Why Zebras Don't Get Ulcers: The Acclaimed Guide to Stress, Stress-Related Diseases, and Coping*. Sapolsky argued that all animals have essentially the same stress-response mechanism, grounded in "fight-or-flight syndrome." Simply put, in the presence of danger, you have only two choices: strike back or flee. From a physiological perspective, regardless of which choice is activated, masses of energy are delivered to your muscles. When a threat is perceived, the brain sends signals through the autonomic nerves to the adrenal glands, which respond by pumping the hormone epinephrine (adrenaline) into the bloodstream. The heart begins to beat faster, blood rushes to the muscles and other organs, and breathing becomes more rapid. After the initial adrenaline surge subsides, the adrenal glands begin to release cortisol until

the threat passes, at which point the nervous system pumps the brakes on the stress response. In humans, though, our awareness adds another level of threat perception. Fear of danger can still linger; therefore, the stress response can continue long after the threat is eliminated. Animals, however, can turn those thoughts off. "Zebras and lions may see trouble coming in the next minute and mobilize a stress response in anticipation," Sapolsky writes. "But they can't get stressed about events far in the future."

THE GOOD, THE BAD AND THE FURBALLS

AS RESEARCHERS EXAMINE STRESS IN THE ANIMAL kingdom, they're further clarifying the differences between short-term and long-term stress. According to Aliza le Roux, a behavioral ecologist conducting research on carnivores and primates in South Africa, some experiments have shown positive effects of stress on lab rats. "Brief, acute stress can actually lead to an increase in neurons in rats' brains," le Roux wrote in "What Animals Can Teach Us About Stress" for *The Conversation*, an academic-backed website that covers global issues. "And rats who were stressed out as teenagers become more impulsive as adults, which can make them more effective foragers, especially under high-risk conditions."

We can all relate to a short-lived pressure boosting our performance, but what about constant stressors? According to le Roux, researchers are beginning to uncover that data. "Studies on wild animals appear to confirm the idea that long-term, chronic stressors can truly decrease your mental acuity," she wrote, pointing to a 2015 study that found that wild guppies living in a stressful, polluted environment made significantly more mistakes in cognitive challenges than guppies used to a more relaxed habitat.

Beyond cognitive deficiencies, long-term stress and trauma can result in compulsiveness in animals. While disorders such as OCD and anxiety are well documented in animals—such as Gus, the neurotic polar bear who made headlines for compulsively swimming figure eights in his pool (for up to 12 hours) in New York's Central Park Zoo—in some cases the tic can evaporate once the stressor is treated. Marinell Harriman, a rabbit rescuer and rehabilitator and the author of *House Rabbit Handbook: How to Live with an Urban Rabbit*, has worked with hundreds of the creatures over three decades. "In caring for quite a few 'sanctuary' rabbits with long- and short-term illnesses," she writes, "we have

seen some miracles of motivation. We are convinced that friendship therapy contributes to the recovery or at least stabilization of sick rabbits.”

One particularly stressed-out 8-year-old rabbit, Jefty, began developing a physical manifestation of that anxiety, according to Harriman. After his mate died of cancer, Jefty began to chew at his fur and developed bald patches. A veterinarian examined the rabbit and found a gigantic hairball lodged in his stomach; the vet thought that it was unlikely that the mass would pass on its own (because of Jefty’s continued chewing) and recommended surgery. Harriman started the animal on a variety of hairball medications to prepare him for surgery, but she tried another approach too: she introduced Jefty to a 10-year-old rabbit that had also just lost her partner.

After Jefty spent a few days with the new rabbit companion, his stress-induced chewing slowed and Harriman canceled the surgery. Although an x-ray showed that the furball was still in his system, it was shrinking. “I won’t try to claim that getting happy cured a furball,” Harriman wrote. “But I will claim that it gave Jefty a reason to eat the hay and greens in front of him. He had someone to dine with and to share his pineapple cocktail.” In the following weeks, Jefty completely stopped his fur-chewing, and the hairball shrank even further. By addressing the cause of Jefty’s lingering stress (the loss of his partner), Harriman seemed to have been able to resolve his physical stress response.

AQUATIC ANXIETY

IN ADDITION TO VARIOUS NATURAL THREATS, wild animals must cope with human-induced pressures. Whales, the largest animals in the world, contain a history of the oceans—and the stress people have caused them—in their ears. Whales accumulate a solid plug of wax in their ear canal, some growing up to 10 inches long. The wax changes colors during seasonal migrations, creating alternate light and dark bands. Like tree rings, these bands allow researchers to estimate a whale’s age, and they also allow them to analyze the substances and chemicals that have coursed through the whale’s body. In a study published in 2018, Stephen Trumble and

Sasha Usenko from Baylor University took earplugs from humpback, fin and blue whales from both the Pacific and Atlantic Oceans from 1870 to 2016 and used the wax to determine the whales’ cortisol levels. “This is the first-ever study to quantify temporal stress patterns in baleen whales,” Trumble said. “While the generated stress profile spans nearly 150 years, we show that these whales experienced survivor stress, meaning the exposure to indirect effects of whaling, including ship noise, ship proximity and constant harassment, results in elevated stress hormones in whales spanning vast distances.”

After moratoriums on whaling were introduced in the mid-1970s and harvests fell by 7.5% annually, cortisol levels in earwax dropped by 6.4% a year. But after cortisol dwindled to essentially negligible levels, they began to increase in the ensuing decades. “From the 1970s through the 2010s,

whaling counts were reportedly zero in the Northern Hemisphere, but mean cortisol levels steadily increased, with recent peaks reaching near the maximum levels observed before whaling moratoriums,” said Usenko. The increase was slow at first but became more drastic in subsequent decades. According to Trumble and Usenko, this rise likely has to do with unusually high ocean temperatures as

well as other man-made stressors, including from submarines entering their domain and from ingesting ocean pollutants such as mercury and pesticides.

According to a 2012 study, noise from ships can lead to chronic stress in whales, which is detrimental to their health. “We showed whales occupying oceans with high levels of ship noise have a chronic stress response,” Rosalind Rolland, who led the study, told the *Guardian* at the time. “We knew whales changed the frequency of their calls to adapt to the ship noise, but this work shows it is not merely an annoyance—it is having a physical effect.” According to Rolland, this type of long-term stress can cause profound depression of the immune system, which puts the whales at risk of diseases. It also can limit their reproduction. The northern right whales that Rolland studied are one of the most endangered species of whales, with only about 450 estimated remaining worldwide.

An anxious
pet does not create
a stressed-out
owner, but the
reverse does seem
to be true.

THE SECRET STRESS OF PETS

WOLVES, WHALES AND OTHER WILD ANIMALS EXHIBIT unique stress-response reactions and effects, but what about our pampered pets at home? A 2019 study of stress hormones in humans and their dogs showed that owners who experience long-term stress and anxiety can pass that on to their perceptive pets. “Dogs are quite good at understanding humans,” zoologist Lina Roth, the study’s senior author, told *National Geographic*. “They’re definitely better at understanding us than we are at understanding them.”

According to Roth’s hypothesis, people with “neurotic” traits (anxious and emotionally reactive, for example) can cause chronic stress in their pets. The study included 58 dog-owner pairs in Sweden (there were 25 border collies and 33 Shetland sheepdogs), with the humans answering questionnaires regarding their own mental health and personality traits, along with those of their pets. The researchers also measured concentrations of cortisol in their hair and fur over several months. While Roth did not find any evidence that an anxious dog created a stressed-out owner, the reverse was true, with dogs picking up on the human’s nervous tics, like nail biting, pacing and irritability. “At first, I was quite surprised at that,” Roth said. “But for the dog, the owner is quite a big part of their everyday life, but the owner has the rest of their life out there.” These findings do not suggest that those suffering from anxiety shouldn’t adopt a pet, but rather that they be mindful about how their behaviors might rub off on a four-legged friend.

Minimizing stress at home should be a priority for pet owners. According to a 2017 article published in the journal *Veterinary Sciences*, factors that elicit stress and aggression in dogs also apply to cats. Citing multiple studies, the authors stated that both animals exhibit extreme stress when separated from their owners or when kept in a cage. “These animals undergo physiological changes such as increased heart rate and release of cortisol—both of which may be associated with negative feelings such as fear and anxiety,” according to the researchers. “In addition, stressed animals may not eat or drink adequately, which can delay recovery.” The research-

Exposure to long-term stress and trauma can lead to compulsive behavior and anxiety in animals.

ers explained that how animals react to stress and fear depends on factors such as their genetic predisposition, previous experience and current environment. Warning signs in a dog may include leaning away while lowering its head, tensing up its tail, trembling and averting its gaze. Tense cats also make themselves seem smaller by lowering their heads, and they may twitch their tail or hiss.

Giving a pet a quiet place to regroup is the best solution to decrease stress, according to a column Lynn Buzhardt, a doctor of veterinary medicine, wrote for VCA Animal Hospitals. But be careful not to overly comfort or pamper the pet, since that can confirm its fear. Buzhardt suggests exercise as a great stress reducer. Walking your dog or playing with your cat can help relieve their tension. If the stress becomes constant, Buzhardt warns that the pet should be evaluated by a veterinarian or a veterinary behaviorist.

IT’S POSSIBLE THAT humans can learn from how the animal kingdom responds to stress. While bursts of short-term stress can boost performance, turning on the fight-or-flight response for everyday human dilemmas means creating a chronic stress level that hurts more than it helps. According to Sapolsky, when it comes to stress and priorities, we should

look to the zebra running for its life from the lion. “For the vast majority of beasts on this planet, stress is about a short-term crisis, after which it’s either over with or you’re over with,” he wrote. “When we sit around and worry about stressful things, we turn on the same physiological responses—but they are potentially a disaster when provoked chronically. A large body of evidence suggests that stress-related disease emerges, predominantly, out of the fact that we so often activate a physiological system that has evolved for responding to acute physical emergencies, but we turn it on for months on end, worrying about mortgages, relationships, and promotions.” Prolonged stress can weaken immune systems and cause health problems in humans and animals alike, but the animal kingdom activates that fight-or-flight stress response only when it truly matters. After all, when was the last time you saw a whale worrying about its mortgage? □

CREATURES IN DISTRESS



A HAIRY SITUATION

A 2013 study in Greenland found that cortisol levels in polar bear hair fluctuated in tandem with changes to climate and ice cover.



RESISTANT TO CHANGE

A 2016 study in New Zealand found that rabbits' stress levels increased after a facility change or a caregiver switch.



POOCH PRESSURE

Dogs with extreme separation anxiety are more likely to have skin disorders.



WAR AND THE WHALES

Researchers believe that noise from bombs, planes and ships in World War II caused remarkably high cortisol levels in whales.

WARMER-WATER WORRIES

A 2018 report of cortisol levels in goldfish found that they were more stressed out in warmer-water temperatures.

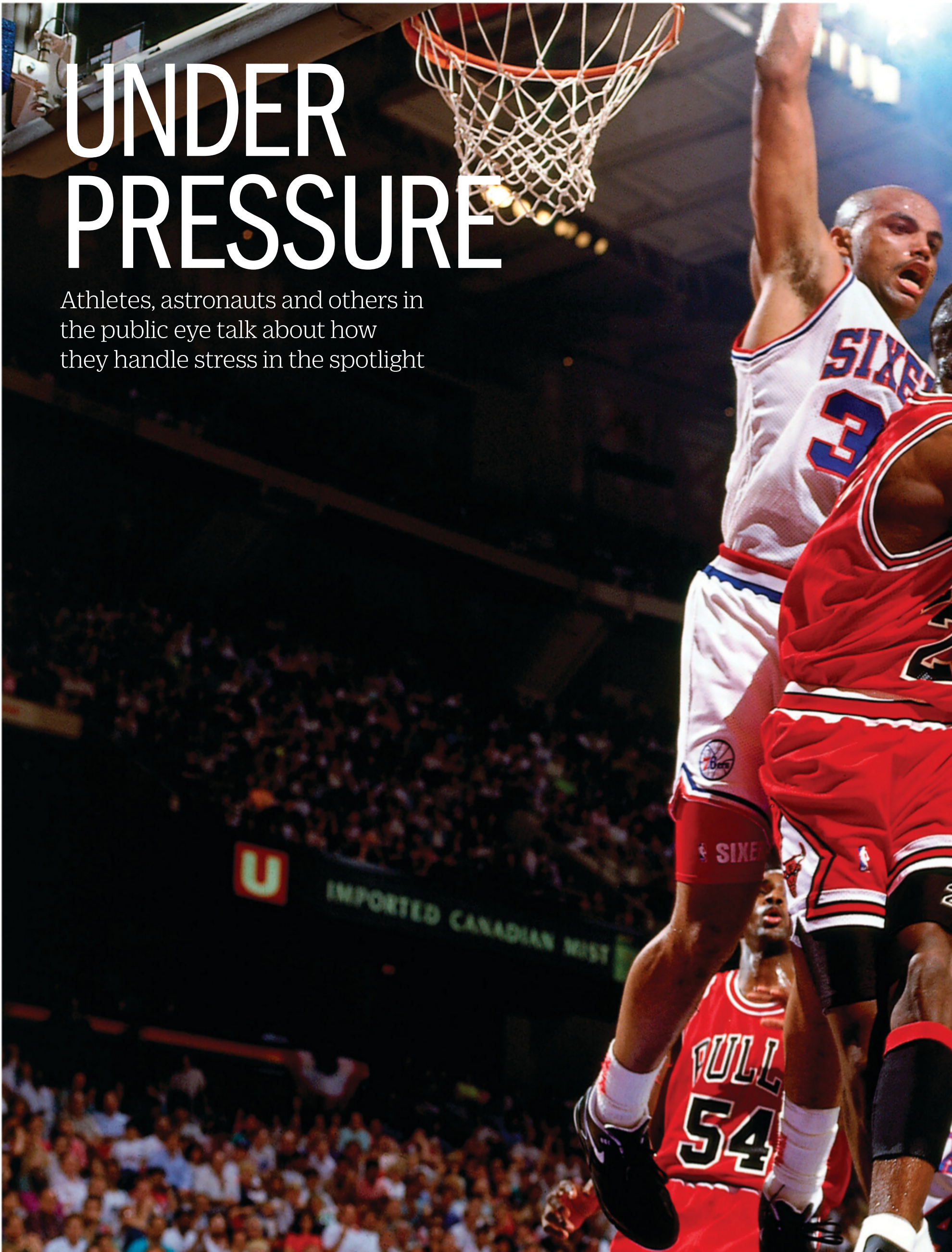


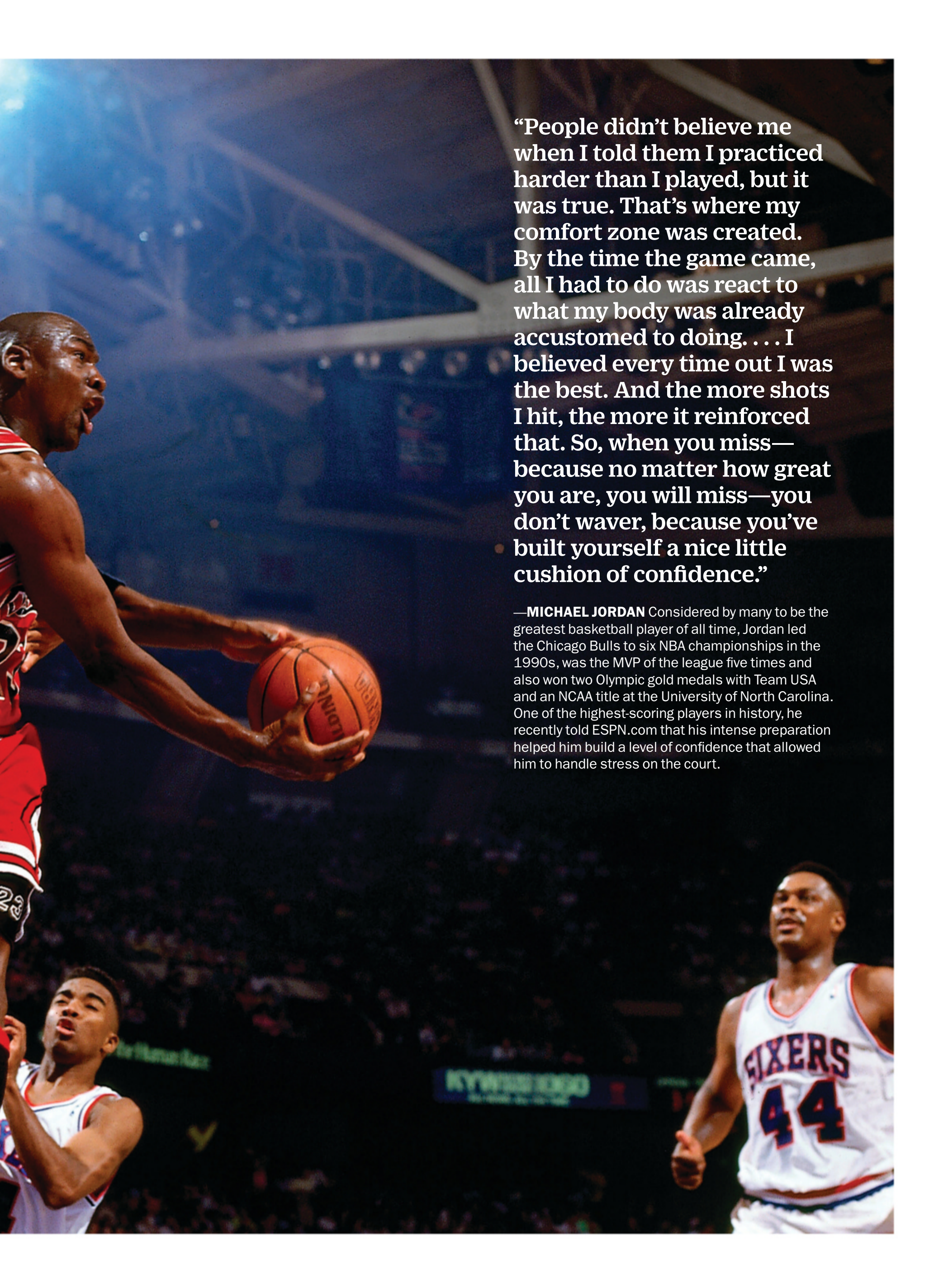
STRESSED-OUT SKIN

Researchers have linked stress levels in house cats to skin disorders and dermatitis.

UNDER PRESSURE

Athletes, astronauts and others in the public eye talk about how they handle stress in the spotlight





“People didn’t believe me when I told them I practiced harder than I played, but it was true. That’s where my comfort zone was created. By the time the game came, all I had to do was react to what my body was already accustomed to doing. . . . I believed every time out I was the best. And the more shots I hit, the more it reinforced that. So, when you miss—because no matter how great you are, you will miss—you don’t waver, because you’ve built yourself a nice little cushion of confidence.”

—**MICHAEL JORDAN** Considered by many to be the greatest basketball player of all time, Jordan led the Chicago Bulls to six NBA championships in the 1990s, was the MVP of the league five times and also won two Olympic gold medals with Team USA and an NCAA title at the University of North Carolina. One of the highest-scoring players in history, he recently told ESPN.com that his intense preparation helped him build a level of confidence that allowed him to handle stress on the court.



“I’m one of the few gymnasts who can just block out anything. I could probably be thinking about pizza before I go and compete. A lot of people like to focus on their routines, but I feel like if I focus on it too much, I get more stressed out and I overthink; and that’s when I don’t do my best. I try not to think about it. I’ll wave to the girls in the crowd, and I’ll just interact with them. I guess I’m just different.”

—**SIMONE BILES** In a sport in which a split-second loss of balance could mean the difference between a gold medal and obscurity, Biles has been seemingly immune to pressure. The American gymnastics star won five medals (four of them gold) at the 2016 Olympics in Rio and became the first woman to win four world championship all-around titles. While her rivals may be obsessing over the details of their routines, Biles lets herself be distracted during competitions, as she shared with the International Olympic Committee’s Athlete 365 website.



“We are not alone, but we feel alone in every step we take. Even if you feel as though your self-worth is at the bottom of a dark, forsaken well, take solace in the fact that I’m literally a Disney princess with an incredible husband, a supportive and loving family, and the best friends in the world, and I still feel broken. But I’m not broken, and neither are you.”

—**PATTI MURIN** The actress, who plays Princess Anna in the hit Broadway adaptation of the blockbuster animated film *Frozen*, suffered what she called “a massive anxiety attack” in April 2018, not long after the show opened. “While the past month has been incredible, all of the ups and downs and stress and excitement really takes a toll on my mental health,” she wrote on Instagram the next day. “I’ve learned that these situations aren’t something to ‘deal with’ or ‘push through.’ ” She wrote about her struggles—and the reality that there are no easy fixes—for Refinery29.



“I felt a little bit like the way I had felt going into combat. There you are, ready to go; you know all the procedures, and there’s nothing left to do but just do it. People have always asked if I was afraid. I wasn’t. Constructive apprehension is more like it. I was keyed up and alert to everything that was going on, and I had full knowledge of the situation—the best antidote to fear.”

—**JOHN GLENN** On Feb. 20, 1962, Glenn became the first American astronaut to orbit Earth, guiding the *Friendship 7* spacecraft around the planet three times. The journey was a success, despite some malfunctions that could have led to tragedy in those early days of space exploration. In his 1999 memoir, Glenn recounted how he had felt on the launchpad as he awaited liftoff.





“You look out and see your friends and family rooting for you. It feels amazing to be that supported, to be lifted up there. Then you have to push that aside and just focus on the word. The pragmatism kicks in.”

—**SPELLING BEE COMPETITORS**

Kate Miller, of Abilene, Texas, was an eighth-grader when she competed in the 2014 finals of the Scripps National Spelling Bee, and she shared her thoughts on handling the pressure with Shalini Shankar for the new book *Beeline*. The event has become a riveting highlight each spring on ESPN, with a handful of students up to eighth grade stepping into the prime-time spotlight for the nail-biting finals, calmly spelling esoteric words ranging from “prospicience” to “autochthonous.”



“We weren’t calm. We couldn’t be calm. The stress was too intense, but we had that focus . . . to be able to do the job in spite of how stressful it was.”

—**CHESLEY SULLENBERGER**


On the frigid afternoon of Jan. 15, 2009, US Airlines Flight 1549 took off from New York City’s LaGuardia Airport en route to Charlotte, N.C. Moments later, the plane struck a flock of Canada geese and began plummeting toward the Hudson River. Sullenberger and his crew managed to make an emergency landing on the water and facilitate a rescue of everyone on board. A decade later, “Sully” explained on *Good Morning America* how the familiarity with stress that comes with being a pilot enabled the crew to pull off the “Miracle on the Hudson.”



“The reason why you’re always stressed is because you want this moment to be something that it’s not. You just stop and you accept this moment for what it is. Just breathe right into that moment and it takes the anxiety and the pressure away of wanting this moment to be something it’s not. Just this moment, one moment at a time. It is a process. It is not just one thing. You don’t wake up one morning and you suddenly have it all together.”

—**OPRAH WINFREY** A media mogul, talk-show host, self-help guru, author, publisher, motivational speaker, actress and philanthropist, Winfrey keeps a busy schedule balancing her many endeavors and a constant stream of challenging situations. In 2017, the pop-culture icon told *Entertainment Tonight* her philosophy for handling life’s endless sources of stress.





“A clever tool in the arsenal to destroy fear: if a nightmare taps you on the shoulder, do not turn around immediately expecting to be scared. Pause and expect more, exaggerate. Be ready to be very afraid, to scream in terror. The more delirious your expectation, the safer you will be when you see that reality is much less horrifying than what you had envisioned. Now turn around. See? It was not that bad—and you’re already smiling.”

—**PHILIPPE PETIT** The French daredevil made headlines on Aug. 7, 1974, when he walked a tightrope between the Twin Towers of the World Trade Center in New York. The illegal stunt (he was arrested when he finished) took place on a 131-foot cable wire about 1,350 feet above the ground as Petit walked back and forth between the iconic skyscrapers. Petit performed other stunts in his career (including a walk between the two towers of Notre Dame Cathedral in Paris) and continues to do smaller events today at age 70. He wrote about this secret to fight off elevated (pun intended) stress in the literary magazine *Lapham's Quarterly*.

CHAPTER TWO

Handling Stress



FINDING BALANCE

Exercise, nutrition and meditation are among the ways we can guide the body and mind to better handle our day-to-day stress

BY EMILY JOSHU



*By helping us
focus on the
present moment,
meditation can
bring a sense of
calm that can
block out the
many sources of
stress in our lives.*





MAYBE YOU WERE LAID OFF from your job without a back-up plan. Maybe you were suddenly diagnosed with a serious medical condition. Or you have scanned through the day's headlines and your thoughts have become entangled in a web of uncertainty. Stress is everywhere—and it's getting worse. John Denninger, director of clinical research at the Benson-Henry Institute for Mind Body Medicine at Massachusetts General Hospital, says we are in “a constant state of alert” and are “more chronically stressed than people used to be.”

While the causes and the severity differ from person to person, the sensation of stress itself is far from abnormal or even exclusively negative. “[Stress] is our body's natural reaction to changes in our environment that require us to respond or adjust our behavior,” says Alice Figueroa, a nutrition coach in New York City and the founder of the website Alice in Foodieland, which focuses on wellness and nutrition. “It allows us to overcome challenging situations, and it provides us with the motivation to get through rough times in our life or to achieve our goals. But when it becomes excessive, stress can be very detrimental to our health.”

One of the biggest misconceptions surrounding stress, Denninger says, is that you can't do anything about it. From diet to exercise to mindfulness to finances, there are several paths you can take to identify and manage these ever-present feelings.

NUTRITION

WHILE WAITING TO GIVE A SPEECH, YOU MIGHT feel nauseated. Before a test or a job interview, your appetite might completely disappear—or you might

find yourself eating an entire pint of ice cream in one sitting. It turns out that there is a direct correlation between stress and digestive and nutritional health, often shown by symptoms such as upset stomach, nausea, diarrhea, stomach cramping or changes in appetite. These biochemical reactions are regulated by the gut-brain axis, a system connecting the brain, central nervous system and gastrointestinal tract. Cognitive and emotional centers of the brain communicate with elements of the gut microbiome, including bacteria and fatty acids. Additionally, the enteric nervous system, found in the lining of the intestinal tract, controls digestive function and the production of neurotransmitters, such as dopamine and serotonin. When stress amps up, it causes disruption in the digestive system, so a diet that supports gut health can calm those physiological stress responses. “That's a really powerful thing, to understand this connection,” Figueroa says. “It becomes important to realize that eating foods that promote our digestive health can also lead to improved well-being that can help us manage stress long term.”

To boost gut health and stress relief, Figueroa points to a balanced, plant-based diet filled with fiber- and prebiotic-rich foods, such as garlic, on-

38%

Adults who say they have overeaten or eaten unhealthy foods because of stress*



A woman and a man are running on a dirt trail in a forest. The woman is in the foreground, wearing a pink tank top and black shorts. The man is behind her, wearing a red t-shirt and black shorts. The background shows a dense forest of green trees.

53%

Adults who say they exercise to manage their stress*

ions, asparagus, bananas and berries. “It’s a food pattern that you can imitate throughout all your meals, making sure that you always have half of your plate [contain] either fruits or vegetables,” she says. Probiotic-rich foods like sauerkraut, kefir, miso, yogurt and kombucha are other mood-boosting options that can ease digestion and protein absorption.

Fixating on losing weight and adopting fad diets (like keto and Paleo) can be additional sources of stress. Diet culture, Figueroa says, often focuses on the idea of reduction, whether it be gluten, sugar or carbs or outright fasting. Instead of obsessing over these cuts, however, it’s better to focus on health-supportive foods. “It’s about learning what foods you like and learning what nutrients those foods have and finding ways to seamlessly incorporate them into your diet rather than having it be something that causes additional stress,” Figueroa says.

EXERCISE

IN 2018, THE U.S. DEPARTMENT OF HEALTH AND Human Services updated its Physical Activity Guidelines for Americans. Recommendations for adults are currently to do at least 150 minutes, or two and a half hours, of moderate aerobic exercise (walking or swimming) or 75 minutes of vigorous aerobic activity such as running each week, as well as incorporating strength training twice a week. “Yoga and other forms of physical activity are crucial for main-

taining our mental health,” says Figueroa. Exercise can alleviate stress by boosting a person’s outlook through a meaningful activity and sense of accomplishment. In a 2019 study published in the journal *Psychoneuroendocrinology*, researchers found that acute habitual exercise had significant stress-buffering effects on the activation of the primary stress hormone cortisol. And in a 2018 study of 52 women published in the *International Journal of Preventative Medicine*, those who participated in 12 sessions of regular yoga practices showed significant reduction in stress, anxiety and depression.

Integrating exercise into your routine could be as simple as going for a bike ride a few times each week, taking a walk after work, running on a treadmill or regularly attending a yoga class. Figueroa also points to yoga’s ability to train the body to cope with overactive fight-or-flight reflexes in people with chronic stress and anxiety.

Exercising produces many of the same physiological reactions that ignite the stress response, as noted by Joseph Ciccolo, an assistant professor of applied physiology at the Teachers College of Columbia University, who has monitored these responses in patients living with post-traumatic stress disorder. The reactions to a high-intensity resistance activity such as weight lifting—breathlessness, rapid heart rate, increased perspiration—mimicked the physical responses to extreme levels of stress. Exposing



72%

Americans who reported feeling stressed about money at least some of the time during the past month*

patients to the same sensations they would experience during a high-stress moment—but in a more positive, self-controlled context—can help them handle other stressors. “With exercise, your body is adapting to that physiological stress response,” Ciccolo says. “When you experience that again, you have a reduced response to it cognitively.”

Despite these findings, hitting the treadmill or taking up weight lifting is not a guaranteed cure-all, especially for someone unaccustomed to such activity. “Exercise can be a stress reliever for people who think of it [that way],” Ciccolo says. “For some people, exercise is a stressor. It’s a task. It’s often considered to be painful, or you’re spending time doing something that you don’t necessarily have enough time to do.” For those who are venturing into fitness-fueled methods of de-stressing, the Mayo Clinic suggests starting small and gradually increasing demand. The American College of Sports Medicine recommends consulting with a physician first if you have a pre-existing condition

such as heart disease, high blood pressure, kidney disease or diabetes.

FINANCES

IN NEARLY EVERY ASPECT OF DAY-TO-DAY LIFE, from our morning cup of coffee to the reality of keeping a roof over our heads, thoughts about money weigh heavily on our minds. According to a 2018 survey by the insurance company Northwestern Mutual, money was the dominant stressor for 44% of Americans. Additionally, a recent report by financial firm John Hancock showed that 69% of workers were stressed about finances.

In 2017, Andrew Abeyta, an assistant professor of psychology at Rutgers University–Camden, published a study in the *Journal of Social Psychology* based on the idea that, from an existential perspective, financial insecurity threatens psychological health by undermining one’s sense of purpose. “People certainly derive a sense of importance or a sense of purpose from their career,” Abeyta says. “When it comes to financial insecurity, that sense of pride and purpose that people get from earning money and putting food on the table and pursuing career goals is threatened.”

A constant fear of being unable to provide can cause perpetual activation of the stress response. For a workaholic who may have lost his or her job, this can lead to feelings of meaninglessness. From a motivational-psychology perspective, Abeyta says, it’s easy to internalize blame and question whether you have what it takes to be successful. A 2017 Australian study in the *International Journal of Environmental Research and Public Health* found that financial stress can drive people to develop a smoking habit, and a 2015 survey for the American Psychological Association (APA) by Harris Poll showed that nearly 1 in 5 Americans ignore health-care needs due to an inability to afford it.

Financial insecurity can differ from other sources of stress because of the necessity surrounding the problem. “It taps these very primal worries,” Abeyta says. A compromised sense of meaning resulting from unemployment or from living paycheck to paycheck can also negatively affect sources of emotional support and interfere with personal relationships. “We don’t want to be around another person who constantly [brings the conversation] back to money,” Abeyta says. “When you lose those avenues for social support in your everyday life, it

31%

Workers who saw a decrease in stress after adopting a program that included meditation*



sends you down a further spiral.”

To cope with financial stress, try to make only one significant monetary decision at a time, track spending daily with a list and remain mindful of ways to reduce spending wherever possible, the APA recommends. Abeyta says it’s important to derive a sense of purpose from sources other than a paycheck, especially for people whose personal sense of meaning is wrapped up in work and money. “Try to think about other things in your life that give you a sense of purpose,” he says, “and spend some time fostering them to avoid this tunnel vision on money, success, financial earnings.”

MINDFULNESS AND MEDITATION

THE CENTERS FOR DISEASE CONTROL AND PREVENTION estimates that from 2012 to 2017, the practice of meditation increased significantly, from 4.1% to 14.2% of American adults. Connected to the broad idea of mindfulness, this popular practice can be particularly effective for stress relief. “[Mindfulness] is a way of approaching life with a present-centered awareness of purpose, paying attention to what’s happening in the present moment instead of being lost in what’s happened in the past and what’s going to happen in the future, as we so often are,” Denninger says.

Meditation unites the body and the mind in a method of relaxation, quelling the physical response

the body feels in moments of stress. This can be as simple as becoming aware of your body’s reactions to stress, such as tension in the shoulders or rapid breathing. Physiologically, blood pressure is lowered and the heart rate is slowed. “The meditative state enables you to go from the stress response into what we’ve always called the relaxation response, so actually achieving a state where your body is not always on alert,” Denninger says.

When first embarking upon a regular meditation practice, start small, with two or three minutes per day, rather than trying to tackle a larger goal like 20 minutes or more, advises Joy Rains, the author of *Meditation Illuminated: Simple Ways to Manage Your Busy Mind*. For those new to the practice or self-conscious about meditating alone, group classes can provide a sense of predictability and support. “There’s something about being in community that can be very healing,” Rains says. “You’re not alone with your stress. Anytime anybody is in community with others that is right for that person, it can be a tremendous source of stress relief.”

Try integrating mindful moments throughout the day, including taking a walk or breathing deeply. Accepting the unavoidable anxiety of daily life and moving forward with centered awareness, Denninger says, brings you to “the place you always have to be in to do any kind of meaningful change.” □

SIMPLE WAYS TO MANAGE YOUR MOOD

A few key changes to your daily routine can help defuse the chaos of work and life

BY AUDREY NOBLE

LET'S FACE IT: WE'RE ALL STRESSED.

In fact, a 2017 Gallup poll found that 8 out of 10 Americans are afflicted by stress. The top three stressors for Americans today are the uncertainty of the nation's future, money and work, according to the American Psychology Association, with workplace stress accounting for nearly \$200 billion in health-care costs, as reported by *Forbes*.

"Stress is a direct result of negative emotions that are out of control," says stress consultant and life coach Elaine Sanders. "It doesn't matter what triggers those emotions—whether it be pressure from a superior, a difficult colleague or time pressure." Sanders lists factors such as a low level of resilience and a lack of emotional regulation as possible contributors to stress.

"Stress is a physical, mental or emotional response to change," says Kathleen Hall, founder and CEO of the Mindful Living Network and the Stress Institute, which help promote stress management. But there's a difference between acute stress and chronic stress. Hall says that while dealing with some acute stress is normal—think of being called to the principal's office or getting into a fender bender—chronic stress, which is a day-after-day, week-after-week, month-after-month phenomenon, is not something we as humans are equipped to handle. And although it's inevitable, there are

healthy ways of dealing with it in the workplace and in your daily life.

FOCUS ON INTENTION

WHEN YOU DIRECT YOUR EMOTIONS ABOUT UPCOMING goals or obligations toward positive feelings instead of focusing on the negative, it can change your attitude, according to Sanders. "Start your day with intention—start every new task with intention, start every interaction with intention," she says. "Don't let a negative emotion run off with you blindly."

Homing in on your intention—whether for a meeting or for any task you are setting out to accomplish—requires some discipline and imagination. Sanders suggests envisioning how you would go about accomplishing the task at hand and focus-



Taking time out for a simple activity like listening to music can help reduce your stress.



ing on a specific positive emotion you would want to feel in that scenario. When you pick that emotion, practice feeling it repeatedly so that you can carry that mindset whenever stress starts to arise.

SET REALISTIC EXPECTATIONS

WE LIVE IN THE ERA OF THE UPGRADE—WE’RE constantly looking for something bigger and better in every aspect of our lives—and that automatically sets us up for failure, according to Hall.

“People think that they’ll be less stressed if they get a better job or better romantic partner,” she says. “I tell clients to stop [thinking that].” Rather, she suggests finding gratitude for the things that we already have in our lives and fulfill us. Focusing on what you do now, Sanders says, can help mitigate the stress about what is next.

FIND A CONFIDANT

SOMETIMES IT TAKES AN OUTSIDE PERSPECTIVE to let us know that we’re not handling stress well. That’s why experts suggest that having someone to confide in can be a key component to reducing your stress. Hall suggests finding someone at work or in your personal life to lean on. “They’ll be the one to know when you’ve gone AWOL, when you’re about to flip a switch or when your productivity has gone down,” she says.

WRITE IT DOWN

PUTTING PEN TO PAPER CAN BE A THERAPEUTIC mode of expression. “Write somewhere—whether it be in a journal or on your computer—the persons, places and tasks that have been triggers of stress,” Hall says. She suggests journaling regularly for at least a month and then reading it back to analyze your level of happiness. “Once you’ve identified those triggers, go talk to your manager or supervisor about these things,” she says.

SEEK PEACE AND LOVE

HALL SUGGESTS TAKING FIVE MINUTES A DAY TO find something that will bring you serenity—such as listening to music or finding quiet time to take deep breaths. This, she says, will reboot your mind and body. And you don’t need to go it alone. “What we know is isolation kills and community heals,” Hall says—there are great benefits to surrounding yourself with caring friends and family or having a loving pet. She also recommends decorating your workspace with plants and colors to elevate your mood and make you feel less alone.

CHANGE YOUR MINDSET

ACCORDING TO BOTH HALL AND SANDERS, THE biggest misconception about stress is that we have to beat it. When we make stress the enemy, we actually create more stress for ourselves. “While stress arises from unregulated negative emotions, intentionally activating positive heart emotions such as care, appreciation, compassion and ease decreases your stress by creating physiological harmony,” Sanders says. “Positive thinking isn’t enough here; it must be positive feelings from the heart to affect your body and brain.” What it all comes down to is learning to react positively—from both mental and emotional standpoints—to negative stressors in our lives. □

A FOUR-LEGGED SOURCE OF RELIEF

Pets and emotional-support animals provide unconditional love for those suffering from stress and anxiety

BY COURTNEY MIFSUD



WHEN VALERIE PARROTT OF Sioux Falls, S.D., was preparing for her wedding day in 2016, she knew right away that Bella was going to be by her side. “It became a no-brainer that she would just walk down the aisle with me and be up there with us, because she’s a part of the family,” Valerie says of her 7-year-old service dog. “She’s a part of me in general.” Bella is a certified service dog in two ways: as a medical alert dog for Valerie’s migraines and as a psychiatric service dog for her agoraphobia and crippling anxiety. Psychiatric service dogs are paired with people who have a diagnosable psychiatric impairment; they are trained to perform certain tasks that might include helping navigate

distracting public situations or alerting and redirecting their handler when they sense, say, a panic attack coming on. Valerie, who had struggled to function in these chaotic environments before Bella came into her world more than five years ago, says that “she gave me my life back.”

Bella, a yellow Lab, played an important role on Valerie’s wedding day. “I could kind of tell that my anxiety was starting to get high, and so could Bella,” says Valerie. “Any bride has anxiety on her wedding day. I just had the added bonus of Bella being able to tell me before it got bad and being able to help me calm down so that I could enjoy the day.” Valerie stepped aside from her bridesmaids, and when Bella leaned against her legs, Valerie crouched down so that she could be on Bella’s level. The service dog placed her head in the bride’s lap, alerting



Bella (right) helps Valerie Parrott deal with panic attacks and anxiety and is a part of the family, along with Valerie's husband, Andrew; their son, Leon; and their other dog, Henry.

Valerie to her own anxiety. According to Valerie, Bella was redirecting her owner so that she could get back to what she was supposed to be doing. “I don’t know where I would be if I didn’t have her.”

While Valerie and Bella have an unusual relationship because Bella is a trained service dog, there is a growing body of scientific evidence that animals, task-trained or not, can improve our mental health. Research since the 1980s has pointed to the physical benefits of pets, specifically dogs. From decreasing blood pressure and cholesterol levels to even helping young children fend off allergies, research has explored the physical evidence. But interacting with a pet, or even with an unknown animal, can help diminish stress, provide relief from symptoms of anxiety and aid with depression.

Sandra Barker, a professor of psychiatry and the director of the School of Medicine Center for Human-Animal Interaction at Virginia Commonwealth University, has been studying the benefits of the human-animal bond for nearly two decades. “When humans are with pets, their social interaction increases—even children with developmental disabilities exhibit more prosocial behavior,” Barker says. She adds that studies have found that interacting with pets is linked to a decrease in levels of the stress hormone cortisol and an increase in oxytocin, which aids in social bonding. “On both the pet-ownership side and the animal-assisted-intervention side, we’re seeing increasing evidence of the benefits.”

Animal-assisted therapy is a growing therapeutic intervention that uses animals, including dogs, cats and horses, to complement existing treatment for depression, addiction, PTSD and autism. In 2009 Barker and her team of researchers studied what happens inside our bodies when people interact with therapy dogs and how that reaction might differ from or parallel what happens when they interact with their own pets. “We wanted to know if there were physiological changes that occurred with your own dog, because we often see similar changes with an unfamiliar dog,” Barker says. The researchers examined people’s brain activity after doing a stressful task and then again after spending time with a dog—their own or an unfamiliar therapy dog. They also tested salivary cortisol levels, heart rate and self-reported stress levels. There was a consistent pattern of increased stress after completing the task and reduced stress after spending

30 minutes with a dog, Barker notes, adding that “the changes we saw with people interacting with their own dog were mirrored in those of individuals with an unfamiliar therapy dog.”

Another project at VCU asked patients to complete brief satisfaction surveys after spending time with therapy dogs. Out of a sample of more than 400 people, 90% said spending time with the therapy dog improved their mood, 85% said they felt more relaxed, and the majority reported that they felt less anxious and less lonely. A third even felt that they had less pain. “It’s pretty amazing that these brief interactions are perceived by our patients as having some of these profound effects on them,” says Barker. “When you think of how long people have lived with dogs in the world, we’ve only recently started investigating these amazing interactions that take place and the benefits of them.”

COLLEGE HAS ALWAYS been a stressful place, and recent research has prioritized limiting those stressed-out feelings. In 2018, Harvard Medical School researchers at Brigham and Women’s Hospital analyzed more than 67,000 health assessment surveys filled out by students at more than 100 institutions and discovered some concerning figures. Three out of four students reported having experienced at least one stressful life event in the past year, while more than 20% of students reported experiencing six or more stressful life events in the past year. Even more alarming: 1 in 4 students reported having been diagnosed with or treated for a mental-health disorder in the prior year, and one fifth of those surveyed had thought about suicide.

While seeking legitimate mental-health therapy is always the best option for comprehensive treatment, a recent study done at the University of British Columbia found a simple action that could ease stress levels for students. “Therapy-dog sessions are becoming more popular on university campuses, but there has been surprisingly little research on how much attending a single drop-in therapy-dog session actually helps students,” Emma Ward-Griffin, the study’s lead author and a research assistant in the UBC department of psychology, told ScienceDaily.com. Published in 2018 in the journal *Stress and Health*, the study involved 246 students who were surveyed before and after therapy-dog sessions. The students spent time cuddling and playing with seven to 12 therapy pups.

The participants filled out questionnaires immediately before and right after spending time with the dogs, and again 10 hours later.

The researchers found that these participants reported a notable increase in happiness along with a significant reduction in stress. The students also reported a surge of energy right after their sessions with the dogs. “The results were remarkable,” said Stanley Coren, a study co-author and professor emeritus of psychology at UBC. “We found that, even 10 hours later, students still reported slightly less negative emotion, feeling more supported and feeling less stressed compared to students who did not take part in the therapy-dog session.”

WHAT IS IT about animals, and dogs in particular, that relieves stress in such a measurable way? A 2015 study from the University of Western Australia and Harvard University found that pets are an important way to meet other people and make new friends. The survey included 2,692 people in Perth, Australia; San Diego; Portland, Ore.; and Nashville. Among the 59% who had a pet, about half said they had gotten to know someone through their animal companion. And compared with other pet owners, those with dogs were five times as likely to have met someone this way.

Mindfulness is also often linked to decreased stress levels, and pets can play a large role in applying its techniques. “The foundations of mindfulness include attention, intention, compassion and awareness,” Ann Berger, a physician and researcher who works with cancer patients and others suffering from terminal illnesses at the NIH Clinical Center in Bethesda, Md., wrote in the agency’s newsletter. “All of those . . . are things that animals bring to the table. People kind of have to learn it. Animals do this innately.”

In addition to the physiological benefits, like a drop in stress hormones, interacting with a therapy dog can help patients in ways that a psychologist might find challenging. “Animals do not prejudge you. They don’t know that you’ve had a divorce. They don’t know that you’re dealing with sexual abuse,” Cynthia Chandler, a counseling professor at the University of North Texas and the founder of the Center for Animal-Assisted Therapy, told mental-health resource PsychCentral in 2018. The power of touch can’t be underestimated either. “There is actually a psychophysiological, emotional and physical [com-

ponent] to interacting with a therapy animal,” says Chandler, who credits oxytocin and endorphins, citing a study that showed an increase in those feel-good hormones after 20 minutes with a therapy dog.

Those suffering with mental illness may see benefits from either trained service animals or their own pets or emotional-support animals, but there are key differences involved. The Americans with Disabilities Act defines service animals as “dogs that are individually trained to do work or perform tasks for people with disabilities.” The law clearly states that those animals that simply provide emotional comfort do not qualify as service animals.

If you have been on an airplane recently, you may have noticed an influx of animals in the passenger cabin. Although in some cases they are task-trained service animals or legitimately needed emotional-support companions, a growing number of schemers have raised eyebrows. All it takes is a quick Google search to bring up dozens of sources for an easy recommendation letter for a fee. Some outlandish examples of emotional-support animals have garnered media attention in recent years. In 2014, a woman was escorted off a US Airways flight when her pig defecated and squealed in the cabin before takeoff. A couple of years later, a passenger was able to provide Delta Air Lines with papers proving that a turkey was the passenger’s emotional-support animal. In 2018, United Airlines banned a traveler from taking a large “emotional-support peacock” named Dexter on a flight. “Today, any pet owner can go online and buy a vest for a dog to pass it off as a service animal to gain access to restaurants, hotels and places of business,” said Rep. Kimberly Ferguson in 2017 when she introduced a bill in Massachusetts to crack down on the misrepresentation of service animals. “Their animals aren’t trained and end up misbehaving in these public places, which gives real service dogs a bad name.”

While legislators and researchers alike are learning just what to make of the profound human-animal bond, it’s important to remember that four-legged companions mean much more than stress relief. “There can be tremendous benefits of having a pet, but [you shouldn’t] go out and obtain a pet because you think it’s going to reduce stress or anxiety,” Barker says. “Pets are a big responsibility and they’re wonderful family members, but I think that people need to be very cautious about the reasons that they’re bringing one into their home.” □

EMBRACE THE PRESSURE

Stress isn't all bad. Sometimes a threatening situation can be transformed into an opportunity for success

BY KELLY MCGONIGAL



IN THE LATE 1990S, AN UNUSUAL experiment took place in the trauma center of an Akron, Ohio, hospital. Patients who had just survived a major car or motorcycle accident were asked to pee into a cup. These urine samples were part of a study on post-traumatic stress disorder (PTSD). The researchers wanted to know: Can you predict who develops PTSD based on their level of stress hormones immediately after the trauma?

One month after their accidents, nine of the 55 patients were diagnosed with PTSD. They had flashbacks and nightmares. They tried to avoid reminders of the accident by not driving, staying off highways or refusing to talk about what happened. Yet 46

patients were not suffering in the same way. These more resilient patients had a different post-accident pee profile than the patients who developed PTSD. They had higher levels of the stress hormones cortisol and adrenaline.

Cortisol and adrenaline are part of what scientists call the stress response, a set of biological changes that helps you cope with stressful situations. Stress affects many systems of your body, from your cardiovascular system to your nervous system. Although the purpose of these changes is to help you, the stress response—like stress in general—is more feared than appreciated. Most people view the stress response as a toxic state to be minimized, but the reality is not so bleak. In many ways, the stress response is your best ally during difficult moments—a resource to rely on rather than an enemy to vanquish.



The study of accident survivors at the Akron trauma center was just the first of several showing that a stronger physical stress response predicts better long-term recovery from a traumatic event. In fact, one of the most promising new therapies to prevent or treat PTSD is administering doses of stress hormones. For example, a case report in the *American Journal of Psychiatry* described how stress hormones reversed post-traumatic stress disorder in a 50-year-old man who had survived a terrorist attack five years earlier. After he took 10 milligrams of cortisol a day for three months, his PTSD symptoms decreased to the point that he no longer became extremely distressed when he thought about the attack. Physicians have also begun to administer stress hormones to patients about to undergo traumatic surgery. Among high-risk cardiac-surgery patients, this approach has been shown to reduce the time in intensive care, minimize traumatic stress symptoms and improve quality of life six months after surgery. Stress hormones have even become a supplement to traditional psychotherapy. Taking a dose of stress hormones right before a therapy session can improve the effectiveness of treatment for anxiety and phobias.

If these findings surprise you, you aren't alone. Most people believe that the body's stress response is uniformly harmful. Stress hormones are seen as toxins to be eliminated, not as potential therapies to be explored. From the conventional point of view, your body betrays you every time your hands get clammy, your heart races or your stomach twists into knots. To protect your health and happiness, the thinking goes, your number one priority should be to shut down the stress response.

If this is how you think about the stress response, it's time for an update. While the stress response can be harmful in some circumstances, there is also much to appreciate. Rather than fearing it, you can learn to harness it to support resilience.

One of the most important ideas from the new science of stress is that we have more than one stress response in our repertoire. In a situation that requires us to perform under pressure—like an athletic competition, a public speech or an exam—the ideal stress response is one that gives us energy, helps us focus and encourages us to act: the challenge response. It gives us the motivation to approach the challenge head-on, and the mental and physical resources to succeed.

Sometimes, however, performance stress triggers

a fight-or-flight response, the emergency instinct that has given stress a bad reputation. When a person has a fight-or-flight response under the pressure to perform, psychologists call this a threat response. A threat response isn't an overreaction of the stress response system—it's an entirely different kind of stress response, one that primes you more for self-defense than for success. Let's consider how these two responses differ and why the right kind of stress response can enhance your performance under pressure. We'll also look at what science can tell us about how to tap into a challenge response even when you feel threatened.

First off, there are important physiological differences between the two responses that can affect your immediate performance and the long-term consequences of stress. One of the biggest differences has to do with how stress affects your cardiovascular system. Both a threat response and a challenge response prepare you for action—something you can feel when your heart starts pounding faster. But during a threat response, the body is anticipating physical harm. To minimize the blood loss that might follow a nasty fight, your blood vessels constrict. The body also ramps up inflammation and mobilizes immune cells to prepare you to heal quickly.

In contrast, during a challenge response, your body responds more like how it does during physical exercise. Because you aren't anticipating harm, the body feels safe maximizing blood flow to give you the most possible energy. Unlike in a threat response, your blood vessels stay relaxed. Your heart also has a stronger beat—not just faster but with greater force. Each time your heart contracts, it pumps out more blood. So, a challenge response gives you even more energy than a threat response.

These cardiovascular changes have implications for the long-term health consequences of stress. The kind of stress response associated with an increased risk of cardiovascular disease is a threat response, not a challenge response. The increased inflammation and blood pressure can be helpful in the short term of an emergency but can accelerate aging and disease when chronic. This does not seem to be true of the cardiovascular changes you experience during a challenge response, which put your body in a much healthier state.

In fact, the tendency to have a challenge response, rather than a threat response, is associated with superior aging, cardiovascular health and brain health.

Middle-aged and older men who have a challenge response to stress are less likely to be diagnosed with metabolic syndrome than those with a threat response. And in the Framingham Heart Study, one of the best-designed and longest-running epidemiological studies ever conducted in the United States, those with a challenge-response physiology had a greater brain volume across their life spans. In other words, their brains shrunk less as they aged.

Your stress response also affects how well you perform under pressure. During a threat response, your emotions will likely include fear, anger, self-doubt or shame. Because your primary goal is to protect yourself, you become more vigilant to signs that things are going poorly. This can create a vicious cycle in which your heightened attention to what's going wrong makes you even more fearful and self-doubting. In contrast, during a challenge response, you may feel a little anxious, but you also feel excited, energized, enthusiastic and confident. Your primary goal is not to avoid harm but rather to go after what you want. Your attention is more open and ready to engage with your environment, and you're prepared to put your resources to work.

When you want to perform well and aren't in danger, a challenge response is by far the most helpful stress response. It gives you more energy, improves performance, helps you learn from the experience and is even healthier for you. But while a challenge response is ideal, a threat response is common in many situations that ask us to perform under pressure.

Psychologists found that the most important factor in determining your response to pressure is how you think about your ability to handle it. When faced with any stressful situation, you begin to evaluate both the situation and your resources. How hard is this going to be? Do I have the skills, the strength and the courage? Is there anyone who could help me? This evaluation of demands and resources may not be conscious, but it's happening under the surface. As you weigh the demands of the situation against the resources you bring to it, you make a rapid assessment of your ability to cope.

This evaluation is the key to determining your stress response. If you believe that the demands of the situation exceed your resources, you will have a threat response. But if you believe you have the resources to succeed, you will have a challenge response.

Lots of studies show that people are more likely

to have a challenge response if they focus on their resources. Some of the most effective strategies for this are acknowledging your personal strengths; thinking about how you have prepared for a particular challenge; remembering times in the past when you overcame similar challenges; imagining the support of your loved ones; and praying, or knowing that others are praying for you. These are all quick mindset shifts that can turn a threat into a challenge—which makes them good things to try the next time you want to perform well under pressure.

Viewing the stress response as a resource can transform the physiology of fear into the biology of courage. It can turn a threat into a challenge and can help you do your best under pressure. Even when the stress doesn't feel helpful—as in the case of anxiety—welcoming it can transform it into something that is helpful: more energy, more confidence and a greater willingness to take action.

You can apply this strategy in your own life anytime you notice signs of stress. When you feel your heart pounding or your breath quickening, realize that it is your body's way of trying to give you more energy. If you notice tension in your body, remind yourself that the stress response gives you access to your strength. Sweaty palms? Remember what it felt like to go on your first date—palms sweat when you're close to something you want. If you have butterflies in your stomach, know that they are a sign of meaning. Your digestive tract is lined with hundreds of millions of nerve cells that respond to your thoughts and emotions. Butterflies are your gut's way of saying, "This matters." Let yourself remember why this particular moment matters to you.

Whatever the sensations of stress are, worry less about trying to make them go away, and focus more on what you are going to do with the energy, strength and drive that stress gives you. Your body is providing you access to all your resources to help you rise to this challenge. Instead of taking a deep breath to calm down, take a deep breath to sense the energy that is available to you. Then put the energy to use, and ask yourself, "What action can I take, or what choice can I make, that is consistent with my goal in this moment?" □

From The Upside of Stress: Why Stress Is Good for You, and How to Get Good at It, by Kelly McGonigal, Ph.D., published by Avery, an imprint of Penguin Group. Copyright © 2015 by Kelly McGonigal, Ph.D.

WHEN DOUBT BECOMES DESTRUCTIVE

Obsessive negative thinking can sabotage our ability to focus on solutions. Here's how to reframe your attitude

BY LIZ FOSSLIE AND MOLLIE WEST DUFFY



IT'S BEEN TWO DAYS SINCE you asked a co-worker to look over your draft, but you haven't heard anything from him yet. If you find yourself starting to anxiously obsess, thinking "He thinks I'm dumb" or "My drafts are always bad and never worth reading" or "He's not responding because I'm a horrible employee who's about to get fired," your self-talk has become self-destructive.

This obsessive kind of negative thinking is called rumination. It happens when our minds wander toward the negative events in the past or the possibility of negative events in the future. Rumination shouldn't be confused with healthy reflection, during which we analyze specific elements of a problem

to better understand it. When we ruminate, we're not focusing on solutions but instead fixating on the problems (or potential problems) themselves.

Harvard psychologists Matthew Killingsworth and Daniel Gilbert estimate that we spend only about half of our time focused on the present. Why does that matter? We're happiest when we live in the moment, no matter what we're working on. In a study of 2,250 people (which is still ongoing through the Track Your Happiness app), Killingsworth and Gilbert found that a wandering mind is usually an unhappy mind.

The good news is that you can learn to bring your mind back to the present and stop ruminating. The first step to feeling better is to notice your cognitive distortion—the dirty tricks your brain plays on you. Psychologist Martin Seligman identified the "three

Recognizing the stressors you can and cannot control is a key to putting your mind at ease.



P's" we tend to focus on after a negative event:

Personalization: thinking that the event is all your fault.

Pervasiveness: thinking that the event is going to ruin every aspect of your life.

Permanence: thinking that you are going to feel like this (e.g., bad) forever.

Don't give the P's a chance! If you find yourself pessimistically obsessing, reframe your thoughts. Here are some ideas:

Personalization: Instead of immediately thinking "I'm the reason we lost the client," try to look at what happened more objectively. On any project, issues will come up that are beyond your control. Own up to your mistakes, but don't needlessly blame everything on yourself.

Pervasiveness: If you realize after a meeting that you accidentally called a colleague by the wrong name, try not to become consumed by anxiety. A tiny mistake is unlikely to start a chain reaction that ends in complete disaster.

Permanence: The words "always" and "never" are usually indications that your self-reflection has turned self-destructive. Say your boss isn't happy with a one-pager you created. Instead of thinking "I'll never be a good designer," focus on the single event and your ability to do better next time: "This wasn't my best work, but I can learn more skills and improve."

Stressors fall into two categories: those you can do something about (the Within's) and those outside your control (the Beyond's). If you're anxious because of Within's—unanswered emails or an impending deadline—the easiest way to feel better is to complete the thing that is stressing you out. As the American painter and writer Walter Anderson noted, "Nothing diminishes anxiety faster than action."

How do you stop stressing about the things you can't control? First, you have to be diligent about recognizing what you can't control. If you feel responsible for the Beyond's, you'll never be able to confidently say you've done enough and relax.

Remember that your thoughts are simply that: thoughts. Acknowledge them, but recognize they are not inevitable truths (even if they feel true). We all have many voices in our heads, but we also get to decide which ones we listen to and how we respond. With practice, we can start to develop a mental immunity to stress by staying in the present and taking care of the things within our control. □

THE MOST STRESSFUL JOBS

BY MARISA ROFFMAN

If you think your job is stressful, try being in the military. For the third straight year, enlisted personnel ranks in an occupation study as the most stressful job in America. The study, which has been conducted by the jobs website CareerCast.com annually since 1989, rates more than 200 occupations based on an evaluation of 11 stress factors, including deadlines, hazards encountered, physical demands and level of interaction with the public.

The rest of the top 10: firefighter, airline pilot, police officer, broadcaster, event coordinator, news reporter, public-relations executive, senior corporate executive and taxi driver. Common threads in these careers including being directly in harm's way and interacting significantly with the public. "There are thousands of people who drive taxis or are firefighters who aren't injured, but there's always that possibility," says Kyle Kensing, CareerCast's online content editor.

On the least-stressful side, diagnostic medical sonographer tops a list that includes hairstylist, university professor, jeweler and massage therapist—most of which have high growth outlooks. But, Kensing cautions, even though those jobs are on the list, "nothing is ever going to be 100% stress-free."





AIRLINE PILOT

Though this career has the highest annual median salary (\$111,930) of the 10 most stressful, the obvious stress factors include travel and having lives depend on you.



ENLISTED MILITARY PERSONNEL OF THREE TO FOUR YEARS

“Part of the reason these jobs are so vital,” Kensing says, “is because they’re so stressful.”



TAXI DRIVER

The profession has undergone a shake-up as ride shares have entered the equation, but this ranking is solely for workers who operate an official taxi. However, Kensing notes, the stress rating is influenced by services like Uber and Lyft “because that is cutting into the hiring outlook and wages, which can negatively impact the industry.”

FIREFIGHTER

In addition to the immediate dangers of injuries, secondary risks of this job include cancer and other illnesses from exposure to carcinogens and, when aiding in medical emergencies, disease.



AND THE LEAST STRESSFUL JOBS



HAIRSTYLIST

While this is a public-facing job, it fits someone with an outgoing personality. “It’s a matter of what people can handle,” Kensing says.



MASSAGE THERAPIST

A 26% growth outlook helped this gig earn a spot on the least-stressful list.



JEWELER

Though this field has a negative growth outlook, it is boosted by the lack of immediate danger, public pressure and deadlines.

THE CHALLENGES OF CHILDHOOD

Kids of all ages face stress, and they may not be equipped to handle it. Learn how to spot the signs and help them cope

BY INGELA RATLEDGE AMUNDSON



AS GROWN-UPS, WE HAVE OUR share of daily stressors: mortgages, high-pressure jobs, iPhones that light up like a Vegas slot machine every 45 seconds . . . need we go on? But while we're busy white-

knuckling it, it can be easy to overlook how the younger members of our household are being affected by stress of their own. "We hold on to this idea that childhood is—or should be—a time of innocence and bliss and that children don't notice what is happening around them or really take it in," says Dawn Huebner, a psychologist and parent coach and the author of *Something Bad Happened*. "For the vast majority, that's not the case."

Statistics back that up. According to a 2011–12

study in the *Journal of Developmental and Behavioral Pediatrics*, more than 1 in 20 children ages 6 to 17 suffer from anxiety or depression—both conditions created or exacerbated by stress. An astounding 70% of teens surveyed by the Pew Research Center in early 2019 confirmed that they consider anxiety and depression a "major problem among their peers."

Not only are kids dealing with stress, but they're doing it without the benefit of perspective. "Their lack of life experience magnifies the intensity of their emotions," says Phyllis L. Fagell, a certified school counselor and the author of *Middle School Matters: The 10 Key Skills Kids Need to Thrive in Middle School and Beyond—and How Parents Can Help*. Because they haven't yet developed the ability to zoom out and acknowledge that "this too shall pass," they're more likely to catastrophize. The reason they're

Young children have not yet developed the ability to put their stress in context, which often leads to feelings of extreme anxiety.



acting like it's the end of the world is because that's precisely how it feels. "The part of our brain that develops last is the part that helps the most with coping and decision-making," says David J. Palmiter, a psychologist and the author of *Working Parents, Thriving Families*. "Kids—especially those suffering anxiety or depression—don't have the same capacity as adults to turn down their fight-or-flight response, so they convince themselves that a kitten is really a tiger. They're being flooded."

When we notice our kids struggling, the natural impulse is to swoop in and try to fix the situation by clearing the obstacles in their path. Alas, that lawn-mower approach doesn't do the trick. Firstly, it's impossible to solve every crisis—welcome to Whack-a-Mole—but more important, we're depriving our kids of an essential life skill. "A certain amount of stress is normal, and it's good for kids to learn how to manage and regulate it," says Mary Alvord, a psychologist and the author of *Conquer Negative Thinking for Teens*. Stress will invariably follow every one of us through life; the sooner we give our kids the tools to handle it, the better.

Stress that goes unchecked can lead to a mul-

titude of problems down the line. "Children with chronic stress or unaddressed anxiety suffer a host of physiological and psychological consequences," Huebner cautions. "They're in survival mode, on the constant lookout for potential danger. Their worlds shrink and they begin to miss out on the experiences that ultimately help children develop and grow."

SPOTTING THE SIGNS

HOW CAN YOU TELL IF YOUR KID IS STRESSED?

Talking to your child about it isn't guaranteed to bear fruit. "Children can't always pinpoint what they're stressed about and are more likely to minimize the impact of specific stressors when asked about them directly," Huebner says. (Although that doesn't mean we should stop trying.) They might not have the language to put to their emotions or the desire to have them drawn out by Mom and Dad, which is why it's so vital to hang out together regularly one-on-one—beyond the distraction of devices or the frenzy of the morning commute—and keep your ears open. "If you're constantly running and gunning, your kids may be aware intellectually of how much you love them, but the quality of communication is not there,"



THROUGH THE YEARS: STRESS AT EVERY AGE AND STAGE

Preschool

Common Stressors:

For infants and preschoolers, the majority of stress comes from not having their basic needs (food, sleep, affection) met. As tots mature, spending time with playmates can be an additional source of stress and conflict—"That's myyyy Thomas the Train!"—as can expectations to behave at home or in public.

Coping Strategies:

Since food and sleep are such cornerstones, make sure your child is getting enough—and the right kind—of both. (And keep in mind that they're moving targets: a toddler might suddenly become the mayor of Tantrum City because he's famished from having a growth spurt.) When your child does behave well, "reinforce the behavior you want to see by giving a lot of very specific praise," Alvord says.

Palmiter says. Make an effort to demonstrate that you're calm, focused and ready to receive whatever they throw at you, even if it's a curveball. Says Palmiter, "One of the most common reasons that kids don't want to talk is because they don't want to stress out their parents."

In some cases, kids' stress will present physically, in the form of stomachaches or headaches. Frequently, clues will arrive in behavioral form, such as major mood shifts. "In children, stress is more likely to take the form of behavior regression like trouble eating, sleeping, separating from parents, or increased irritability or anxiety," Huebner says. "For example, needing to know 'the plan' at all times or needing to be reassured more than usual."

Other signs include social changes—acting withdrawn, having trouble with friends—and changes in academic performance. Is your son suddenly failing Spanish or being disruptive in the classroom? "Bad' behavior is virtually always a sign that a child is struggling with a feeling or situation beyond his ability to cope," Huebner says. On the other end of the spectrum, says Fagell, "an uptick in perfectionist behaviors can also be an indicator."

As a rule of thumb, if you're concerned your child has more stress than is manageable—or wondering if professional help is warranted—look for two factors: "The depth of the negative response, and how long it lasts," Palmiter says. "For most developmental transitions, whether it's going to kindergarten or learning to drive, the reactions don't interfere in a major way with life's obligations, and they usually go away within a week or two." Of course, children are often mercurial by nature, so the occasional tantrum or outsize reaction is no need for alarm, but if the intensity surpasses what is usual (or socially acceptable), it could be an indication that there's more going on. Explains Alvord, "If a kid is stressed out, it's normal to yell—it's not normal to hit somebody."

Need more intel? Turn to other adults in your child's orbit (teachers, coaches, the guidance counselor) as a resource. Don't focus solely on academic or performance issues but on the whole picture. Some questions to ask: Is my child an active participant or does she shrink away from taking risks? What's recess like for him? How does she manage in groups? Does she have friends? How does he respond when something doesn't go his way? Have there been any



Elementary School

Common Stressors:

Separating from parents, handling transitions and doing things that are unfamiliar or difficult all rank high. Explains Huebner, "Elementary

schoolers worry about 'messing up,' being singled out or facing a challenge they don't feel prepared for." They may also be dealing with disruptions at home. "Divorce rates

among parents get much higher at this stage, which means a lot of kids are suddenly going back and forth every week to different houses," Alvord says.

Coping Strategies:

Kids want to know what's coming at them, says Huebner, "so it's helpful to have routines and to preview changes." As various problems crop up, enlist kids for their ideas. "Involving a child in thinking up possible solutions, and then implementing one, is tremendously empowering," Huebner says. (If a new seating chart is causing agita, for example, brainstorm with your child about how to handle it.) For children who are fearful or anxious of bad things happening, encourage them to come up with soothing mini mantras ("Just because I'm scared doesn't mean I'm in danger"); Fagell recommends writing them down on "coping cards."

noticeable changes lately? Armed with the answers, you can begin coming up with a game plan together.

SOURCES OF STRESS

FIGURING OUT WHAT, EXACTLY, IS EATING YOUR kids is half the battle. Certain stressors are prevalent within age groups, but there are also more general culprits that impact kids from infancy through early adulthood.

The Mom and Dad Effect: Although it might sting to hear, there's no denying that our own relationship with stress has a trickle-down effect. "Kids are watching all the time, taking in how you resolve conflict, cope with stress, navigate daily challenges and interact with others," Fagell says. "If you're flinging insults or arguing about money, your child is listening."

On the flip side, we have the power to set a positive example. "Kids often have no idea how to make themselves feel better, so parents need to model and vocalize the strategies that work," Fagell says. "Try saying something like, 'I'm feeling overwhelmed, so I'm going to put the rest of this off until tomorrow and take a walk. It can wait.'"

Whatever issues may be plaguing the grown-ups under your roof, resist the urge to "shield" your kids from the truth. (News flash: No matter how covert you think you're being, they'll probably pick up on it anyway and assume the worst—or that it's their fault.) Address the elephant in the room in a developmentally appropriate way. "You shouldn't make dramatic statements like, 'Your father is leaving us!' or 'Fifteen children were just murdered at a school,'" Huebner says. "Instead, you might say, 'Dad and I both love you so much, and even though we've tried to work things out, we've decided that we need to start living apart from each other.' Or 'Something really sad happened. A person with a gun hurt people.' Then allow your children to ask questions and answer them using simple, noninflammatory, non-judgmental language."

The Outside World: Another trigger for stress is media exposure, in its myriad forms. "Kids today are dealing with a 24/7 news cycle, which means they may repeatedly see images of scary events," Fagell says. And those events, however remote, can be interpreted as extremely personal and terrifying. "Younger children can't discriminate between some-

Middle School

Common Stressors:

"Middle school is a whole new ball game: in addition to the hormones, this is when kids really develop an awareness of how they stack up to their peers socially, academically, athletically and physically," Fagell says. "Bullying peaks in middle school as kids jockey for a position in the hierarchy." This is also when homework gets cranked up and students transition from having one teacher to being in multiple classrooms. (And don't underestimate locker drama!)

Coping Strategies:

Create opportunities to connect by setting aside one hour a week of special



time with your child. "The criteria is no technology, no other humans and undivided attention. By giving them that time and space, they'll be much likelier to share with you if something is going on," Palmiter says. Kids

will likely need puberty demystified, although they probably won't want to learn about it from you. "Give them some good books like *My Changing Body* and say, 'We can talk about it when you're ready,'" Alvord advises.

Employ a similarly chill approach with heart-to-hearts, says Fagell. "Rather than saying, 'What stresses you out?' ask, 'What do you think most kids would say is the most stressful part of seventh grade?'"

thing that happened 2,000 miles away and the here and now,” Alvord says.

Even seemingly friendly fire can be hazardous. Social media provides endless opportunities to feel excluded, isolated or less than. “Kids barely get a breather from social drama, and they’re constantly subjected to curated images of unrealistic ideals,” Fagell says. For tweens and teens in particular, says Palmiter, “there’s a lot of pressure on kids to look successful and stack up to their peers.” To minimize the input, monitor your kids’ online activity and phone usage. “I advise parents to delay giving their child a phone as long as possible, preferably until they’re well into middle school, and to stay involved and spot-check their posts,” Fagell says. “I also recommend limiting use to less than two hours a day and designating a cutoff time in the evening, since a good deal of the misuse occurs late at night when kids are overtired or more impulsive.”

Too Much Work, Not Enough Play: Just like adults, kids today fall victim to the pitfalls of over-achieving and overprogramming. “I’ve seen kids worrying about their academic performance as young as second grade,” Fagell says. “They need unstructured

time to relax and play. Don’t schedule every minute of their week, and recognize when they need to unwind.” Psst: This is another chance to practice what you preach. “If you wait to meet your own emotional needs until after life’s others obligations are fulfilled, your kids will see that,” Palmiter says. “It will be woven into their unconscious marrow.”

As for that unwinding? Screens may be the preferred choice for kids of all ages, but they’re hardly optimal. “Watching TV or playing video games is so passive,” Alvord says. “Kids should be spending at least an hour outside a day getting exercise and having creative playtime.”

THE ROAD AHEAD

WHATEVER ISSUES YOUR FAMILY MIGHT BE facing, take comfort in the fact that you’re not in uncharted territory, and—although it may feel like it—stress certainly isn’t unique to our modern age. “Stress has always been a part of every generation, every year,” Alvord says. “Over time, we’ve just become more sophisticated in our awareness and acknowledgement of it.” In other words? Know better, do better. □

High School

Common Stressors:

A 2013 survey of high schoolers by the American Psychological Association found that the most common sources of stress were school (83%), getting into a good college or figuring out what to do after high school (69%) and their family’s finances (65%). Social anxiety looms large during this period as well. “If a teen sends a text and doesn’t get a response right away, she’ll jump to ‘My friend is mad at me’ in a matter of minutes,” Alvord says.

Coping Strategies:

Rather than trying to solve your teens’ crisis, validate it. “There will be room for trouble-shooting

later,” Palmiter says. “First, they want to feel understood.” Another way to connect? Bust out some stories from the vault. “Kids can learn a lot from their parents’ pasts, including their screwups,” Palmiter says. And since insecurity about money is so prevalent, address it. Be mindful of your own attitude: Are you treating money as a source of great importance or angst? And although it’s perfectly reasonable to be budget-conscious, deeper fears should be assuaged. Finally, take stock of your kids’ school stress in order to steer them accordingly. “You need a realistic sense of your child’s academic abilities and aptitudes so

you can help them figure out how to play to their strengths,” Palmiter says.

Oh, and once your kids have successfully flown the nest? Don’t think you’re off the hook then—or ever. “My kids have gone off to college,

so now my wife and I are getting worried calls and texts from them about job interviews, internships and all the rest,” Palmiter says. “The parenting responsibilities just do not stop—and that’s a good outcome!”



THE YOUNG ARE MOST RESTLESS

Generation Z is stressed out—and gun violence is partly to blame

BY JAMIE DUCHARME

GUN VIOLENCE, POLITICAL TURMOIL AND PERSONAL problems are causing significant stress among America's teenagers and youngest adults. Members of Generation Z—people ages 15 to 21—reported the worst mental health of any generation included in the American Psychological Association's 2018 "Stress in America" report, which was based on almost 3,500 interviews with people ages 18 and older plus 300 interviews with teenagers ages 15 to 17.

Just 45% of those in Gen Z reported "excellent" or "very good" mental health, compared with 56% of millennials, 51% of Gen X individuals, 70% of baby boomers and 74% of adults older than 73. Of the Gen Z respondents, 27% called their mental health "fair" or "poor"—and stress seems to be largely to blame, with 91% of Gen Z adults saying they had felt physical or emotional symptoms, such as depression or anxiety, associated with stress.

Stress levels were high across generations. The average reported level across age groups was a 4.9 out of 10. But while older adults tended to fall below this line—the averages among boomers and older adults were 4.1 and 3.3, respectively—the opposite was true for younger generations. Gen X had an average stress level of 5.1, and millennials had the highest overall, at 5.7. Gen Z fell in the middle, at 5.3, but in many categories, the youngest age group felt more stress than older ones.

Gun violence seemed to be a particularly large source of stress for the school-age generation, with 75% of those in Gen Z calling mass shootings a significant source of stress. Seventy-two percent said the same of school shootings, and 21% of Gen Z



students said the thought of a shooting occurring at their school was a constant or frequent source of stress. Their folks agree: 74% of parents included in the survey called school shootings a significant source of stress.

Other issues in the news, from rising suicide rates to sexual harassment to migrant-family separation, also sparked more stress among Gen Z individuals than those in other generations, according to the report. Sixty-two percent called rising suicide rates a source of stress, compared with 44% of adults overall; 53% said the same of reported sexual harassment and assault, compared with 39% of adults overall; and 57% were stressed by family separations, compared with 45% of adults overall.

But it's not just the news that's bringing young adults down. Work, finances and health-related con-

High school students protested against gun violence—a major Gen Z concern—at the U.S. Capitol in March 2019.



cerns all stressed out more Gen Z adults than adults overall, the report says. Money was the most common source of stress, affecting 81% of Gen Z adults and 64% of adults overall.

Just as concerning as the prevalence of stress was the struggle to manage it. Though 37% of Gen Z individuals—more than any other generation—reported receiving help from a mental-health professional, only half said they felt they did enough to manage their stress. Nearly three quarters also said they could have used more emotional support over the past year.

Other recent surveys have shown that levels of loneliness are high among young people, which may contribute to the stress epidemic. Research has shown that a strong social network can help mitigate the effects of stress and improve men-

tal health overall. Social media doesn't seem to be helping either: while about half said it was a source of support, 45% said social media made them feel judged, and 38% said it made them feel bad about themselves.

Having difficulty coping with stress wasn't just a Gen Z trait. About 20% of all respondents to the "Stress in America" survey said they didn't do enough to manage their stress.

Amid the high levels of stress and frustration with the national and political climate, voting among younger generations was particularly high in the 2018 midterm elections (including 4.5 million Generation Z voters, according to the Pew Research Center). Especially encouraging: 75% of all survey respondents said they feel hopeful about their future. □

CHAPTER THREE

Stress in Society

THE NERVE-RACKING NEWS CYCLE

Regardless of your political leanings, there's no escaping the feelings of worry and frustration that come with today's volatile headlines

BY EILEEN DASPIN





The endless stream of news from all forms of media has increased our stress, and attempts to cut back bring their own forms of anxiety.



L AINE DUCHARME, A PSYCHOLOGIST in Glastonbury, Conn., is accustomed to patients talking about how stressful it is to follow the news. The topic is so routine, she even has a list of meditation apps she recommends to counter the effects of troubling headlines and the 24/7 breaking-news cycle.

Yet Ducharme was taken aback recently when a patient brought up the subject, mostly because he did not fit the profile. He wasn't partisan. He wasn't on Twitter. In fact, he was not yet in second grade. "The news was on in his house all the time, and it was scaring the hell out of him," says Ducharme, who spoke to the parents. "They weren't aware it was bothering the child."

That the country's youngest citizens are feeling stressed by the news may have been inevitable. After all, grade-schoolers inherit all kinds of adult baggage, from bad eating habits to social prejudices. But the fact that little kids too are upset by weighty issues does not bode well for the national psyche. Today, more than half of Americans say the news causes them stress and many report feelings of anxiety, fatigue or sleep loss because of it, according to a 2017 survey by the American Psychological Association (APA). Therapists such as Ducharme report that between 85% and 90% of their patients discuss the stress of the news cycle during their counseling sessions. A handful of businesses have banned cable news shows from televisions on their premises. Colleges are posting notices on their websites advising students on how to wean themselves from news coverage. *Vogue* magazine recently steered readers to Botox injections to relieve the jaw clenching that accompanies "headline stress disorder."

The situation is on track to get even worse. Nearly 1 in 10 Americans report they check the news hourly. Twenty percent say they constantly monitor their social-media feeds, which expose them to headlines whether they like it or not. The constant ping of breaking-news alerts causes anxiety, as do efforts to reduce or ignore them. It's a self-perpetuating pattern in which wanting to know what will happen next reinforces the uncertainty that fuels anxiety, says Vaile Wright, the APA's director of research and special projects. Americans today are not only reporting more symptoms of stress, such as headaches and irritability; they are doing so with growing frus-

tration. "[Uncertainty] prevents us from being able to plan," Wright says. "So we do things to mitigate. We hit refresh, and it raises stress and anxiety again."

The reasons for the rising stress levels from news are hardly surprising. The news cycle is an around-the-clock affair. Updates are generated not just by journalists but by anyone with a social-media account, from friends to fundraisers to trolls. The bulletins are delivered nonstop, "breaking into our kitchens and bedrooms, places that are considered safe," says Graham Davey, the author of *The Anxiety Epidemic*. What's more, they often arrive with a heavy dose of attitude or bile. When a reader comments digitally on a news development, she or he risks starting a Twitter war with an anonymous army of opinionated, fast-fingered and vindictive holders of the opposite point of view.

As might be expected with Donald Trump in the White House, more Democrats than Republicans report they are stressed out by the national political conversation. The left blames Trump for making ruinous policy decisions, polarizing the country and kicking civility to the curb. Some Democrats say they even get irritated just hearing Trump's voice. But it turns out that political stress is actually a pretty bipartisan affair. Almost half of Republicans also characterize talks with people across the aisle as stressful, according to a 2018 Pew Research Center survey, and nearly two thirds of Americans of all political stripes say the future of the nation is a source of stress. Consumers on the left and right worry about the impact of the tariff war and how it might affect their household budgets, just as the prospect of war with Iran unsettles Democrats, Republicans and Independents.

"It's not just because of Donald Trump. It's everything. It's watching politicians unable to do anything and yelling and setting the tone that anything goes," says Ducharme, who specializes in collaborative divorce counseling. She compares cable news coverage to couples in therapy sessions. "They often are screaming at each other. They aren't listening. They just go back and forth."

"**HEADLINE STRESS DISORDER**" seems to have first bubbled up during the presidency of George W. Bush. In 2003, when Bush was in his second year in office, conservative columnist Charles Krauthammer noted that Bush's most ardent critics—"otherwise normal people," in the journalist's words—were



President Donald Trump and his Twitter feed are a frequent source of turmoil for Americans of all political persuasions.

exhibiting “the acute onset of paranoia . . . in reaction to the policies” of the administration. Krauthammer dubbed the phenomenon “Bush Derangement Syndrome.” A decade later, the right found itself suffering a similar affliction in reaction to Barack Obama, whose two terms as commander in chief were defined by overtly bitter partisanship inside the Beltway and overheated rhetoric outside it, especially in conservative-leaning publications and on talk radio. “It isn’t so much paranoia about President Obama’s policies as it is paranoia about the man himself,” wrote Ezra Klein on the news site Vox in 2015. “That he is, in some fundamental way, different, foreign, untrustworthy, even traitorous.”

Under the Trump administration, headline stress disorder has ramped up, with critics spinning outraged news segments out of almost any development, significant or otherwise, while right-wing media do the same in reaction to moves by Speaker of the House Nancy Pelosi and other Democrats. There seem to be two main flavors of shows. There is the opinionated-host format, in which a newscaster preaches from his or her respective corner of

the political ring, and there is the panelist approach, in which guests offering opposing points of view yell, interrupt each other and roll their eyes a lot. This fisticuffs approach of course has been good for the news business—the so-called Trump bump—but for a viewer flipping through the cable channels for actual information, it can be anxiety-producing.

Bahram Akradi, for example, is an avid consumer of the news and also the CEO of Life Time, a health and wellness company with more than 140 upscale athletic clubs across the country. One of the clubs’ amenities are the televisions—some 50 to 60 per club—for members to watch while working out. They have always been great for multitaskers and anyone who wants a distraction from their aching muscles. But starting a few years ago, Akradi felt the cable news broadcasts were offering the wrong kind of diversion, one delivered in often harsh or demeaning tones. So in January 2018, he pulled the plug, ordering his managers to remove CNN, MSNBC and Fox News from all Life Time television sets.

It was an easy decision to make, Akradi says now. “We are promoting a healthy way of life, not just nu-

trition and workout. When you feel disrespected [by a newscaster], your blood pressure goes up. It's not healthy for you." Some 500 to 600 irate members called in to complain about the move, but Akradi, with help from his vice president of corporate communications, contacted each customer. Today it's a nonissue. The Life Time screens in clubs are tuned to Bloomberg or CNBC, which cover financial news, or the Discovery Channel. Members who want to watch Fox's Sean Hannity or MSNBC's Rachel Maddow can do so on their personal devices, via Wi-Fi, or on machines with individual screens, says Akradi.

Other businesses have followed in Akradi's footsteps. About 10 days after the Life Time announcement, Steamship Authority, a Massachusetts ferry line that connects Martha's Vineyard, Cape Cod and Nantucket, banned cable news networks from its vessels and terminals, citing complaints from passengers. More recently, in April 2019, Army & Air Force Exchange Service, a retailer that operates convenience stores and food courts on military bases in more than 30 countries, emailed locations recommending that they steer away from news and tune in to sports. "As a federal entity, we remain neutral on political issues. News channels should not be shown on common area TVs due to their divisive political nature," the note read. In a follow-up email, Army & Air Force removed references to news and politics but stuck to its message that sports were OK. (CNN did not return emails requesting comment for this story; MSNBC and Fox News declined to comment.)

THERE HAVE BEEN other periods in U.S. history when news events and the media's coverage of them were sources of stress. The 1960s, for example, were a famously turbulent decade. In addition to political assassinations, the war in Vietnam and racial unrest, young people defied the establishment, protesting the war and marching against inequities. At the time, the Fairness Doctrine—a Federal Communications Commission requirement that broadcasters provide both sides of a controversial argument—was still in effect and on-air personalities strove to give both the government and protesters a say. For the most part, viewers accepted the point of view of network

news anchors such as Walter Cronkite (known as "the most trusted man in America"), David Brinkley and Chet Huntley.

But public perceptions of news coverage changed in 1968 during the Democratic National Convention in Chicago, when Mayor Richard Daley sent national guardsmen and police to violently break up protests outside the convention center. CBS, NBC and ABC covered the events as they unspooled, prompting anxious objections from the public. Telegrams arrived throughout the night, attacking the networks for how they covered the violence, according to media-studies scholar Heather Hendershot. Among other things, they were criticized for calling protesters "young people" and "protesters" instead of "terrorists" and for not showing that the protesters deserved to be attacked. At the time, "[CBS *Evening News*] somehow accepted that something had gone wrong in Chicago and that the problem was the news media, which is bizarre," writes Hendershot. "I can't explain it."

The constant pinging of breaking-news alerts causes anxiety, as do efforts to reduce or ignore them.

Surprisingly, stress overall in the U.S. has actually declined since 2007, according to APA data. That's the year the organization began asking participants in its "Stress in America" survey to rate the stress levels they experience compared with what they think healthy stress levels should be. (The topics that give people

the most anxiety typically are some configuration of money, work, health and, more recently, the nation's future.) In 2007, respondents reported stress levels hovering around 6.2 out of a possible 10 (10 being the most stressed), a number that has ticked down over the years, hitting 4.9 in 2018.

The exception to the trend, though, is notable. In November 2016, following the presidential election, stress levels jumped from 4.8 to 5.1, what Wright of the APA characterizes as "statistically meaningful." Though the levels have since returned to the 4.9 range, Wright adds that people are reporting more symptoms. She believes people have simply become acclimated to being stressed, calling it "the new normal."

Ducharme, the Connecticut psychologist, says even she has experienced news stress. Returning home recently after a tough afternoon with patients, she turned on the television to unwind. She flipped



Some companies have removed cable news networks (with opinionated hosts such as Rachel Maddow and Sean Hannity) from their public TV screens.

to Fox's *The Five*, a roundtable discussion of current events, as the show's hosts were shouting over each other. Ducharme, who says she doesn't align with either major political party, could feel herself getting aggravated. After scolding the screen out loud, she tweeted at *The Five* to start listening to one another. "I just came from trauma," Ducharme remembers thinking. "I don't want this. I want to watch *Mrs. Maisel*."

IRONICALLY, PEOPLE WHO scale back on their political-news consumption sometimes feel equally stressed, fretting that they are abdicating their civic duty. "How can I not watch?" they ask. "It's irresponsible."

Amy Smotherman, a Democrat who works in the nonprofit sector in Nashville, Tenn., knows this train of thought. She has tried to pull back from following politics and even got rid of her cable subscription, in part because she feels exhausted—and often embarrassed—by Trump. She cites the president's scathing Twitter attack on London mayor Sadiq Khan during Trump's state visit to the U.K. in June. "He called Khan 'a stone-cold loser,' says Smotherman. "That

is so mortifying." It is the type of news she says she does not need to hear. But at the same time, Smotherman worries about falling out of touch. "I don't want to appear stupid if something has happened I should know about."

Perhaps *Vogue* was on to something when it suggested Botox as a way to deal with stress from the news—or not. A couple of years ago, model Chrissy Teigen, who has feuded publicly with Trump, took to Twitter to announce that he was causing her "crippling anxiety." The situation was so bad, Teigen said, that she was grinding her teeth and had to shave a tooth down and get Botox injections to relieve her jaw-muscle tension. "I was not like this before," Teigen tweeted. "Pay my bill, POS POTUS." The message received nearly 20,000 likes.

Then came the backlash. Among other complaints, the Twitterati accused Teigen of being a socialist and an out-of-touch Hollywood elitist who "should take responsibility for her own mouth." Siding with Trump, one Teigen critic griped: "Why should he pay your bill? You caused your anxiety yourself by obsessing over him." □

THE PERILS OF SOCIAL MEDIA

Instagram, Facebook and other platforms keep us connected, but they come with an emotional cost

BY EMILY JOSHU

IN APRIL 2019, THE HEAD OF INSTAGRAM TOOK THE stage at Facebook's annual developer conference to announce upcoming changes to the massively popular photo-sharing app. Adam Mosseri revealed that Instagram (which is owned by Facebook) would be testing a version of the social-media service that hides the number of likes a post receives. Only the user who uploaded the content would see how many people double-tapped their post. "We don't want Instagram to feel like a competition," Mosseri said at the event.

It was an unprecedented acknowledgment of the possible mental-health repercussions of chasing follows and likes. Investing so much time in social media can increase stress levels through factors like envy about friends' experiences, feelings of inadequacy over having fewer followers than one's peers, or fear of exclusion. A 2017 report from the Royal Society for Public Health in the U.K. found that among almost 1,500 teens and young adults, Instagram was the worst-ranked social-media platform for mental health and well-being. Though it scored well in terms of self-expression and self-identity, it was associated with high levels of anxiety, depression, bullying and fear of missing out. Twitter was ranked the second-best network in the same survey, surpassed only by YouTube. However, Twitter co-founder and CEO Jack Dorsey has stated that there is room for improvement. "If I had to start the service again, I would not emphasize the follower count as much. I would not emphasize the 'like' count as much. I don't think I would even create 'like' in the first place," he said at the TED2019 conference earlier this year. Dorsey also pointed to



issues such as abuse, harassment and misinformation that have become rampant throughout Twitter.

Despite the potentially bleak consequences, however, social media shows no sign of slowing down: Instagram now hosts over a billion users, and Twitter has roughly 330 million active users each month. "Social media is obviously one of the most rapidly growing technologies of all time, if not *the* most rapidly growing technology of all time," says Brian Primack, dean of the College of Education and Health Professions at the University of Arkansas. "And it's not something that people use just now and then. It's tremendous exposure, but it's also a very emotional exposure."

Teenagers, according to Pew Research Center's 2018 report "Teens, Social Media & Technology," have mixed views on the impact. The survey found that 45% of U.S. teens felt social media was neither positive nor negative, 31% felt it was mostly positive, and 24% felt it was mostly negative. Other research has yielded much more consistently negative, and at times detrimental, effects. "Since 2012, there's been a pronounced rise in unhappiness, depression, suicide



According to a Pew Research Center study, name-calling and rumor-spreading were the top reasons for social media's negative effect.

attempts and suicide among adolescents and young adults,” says Jean Twenge, a professor of psychology at San Diego State University and the author of *iGen: Why Today's Super-Connected Kids Are Growing Up Less Rebellious, More Tolerant, Less Happy—and Completely Unprepared for Adulthood*.

Twenge investigated individual associations between social-media use and happiness among adolescents and young adults in her 2019 study “More Time on Technology, Less Happiness?” The study concluded that as social-media use increases, well-being decreases, with one exception. Light users scored higher in well-being than those who didn't use social media at all. Just weeks earlier, Primack (at the time the director of the Center for Research on Media, Technology and Health at the University of Pittsburgh) found an even more direct correlation between social-media time and the likelihood of depression, anxiety and social isolation. And those who had negative experiences on social media showed higher levels of social isolation. (Almost all research conducted to date has focused on social-media use

among those between the ages of 18 and 40. So far, there is little data on how effects differ based on age.)

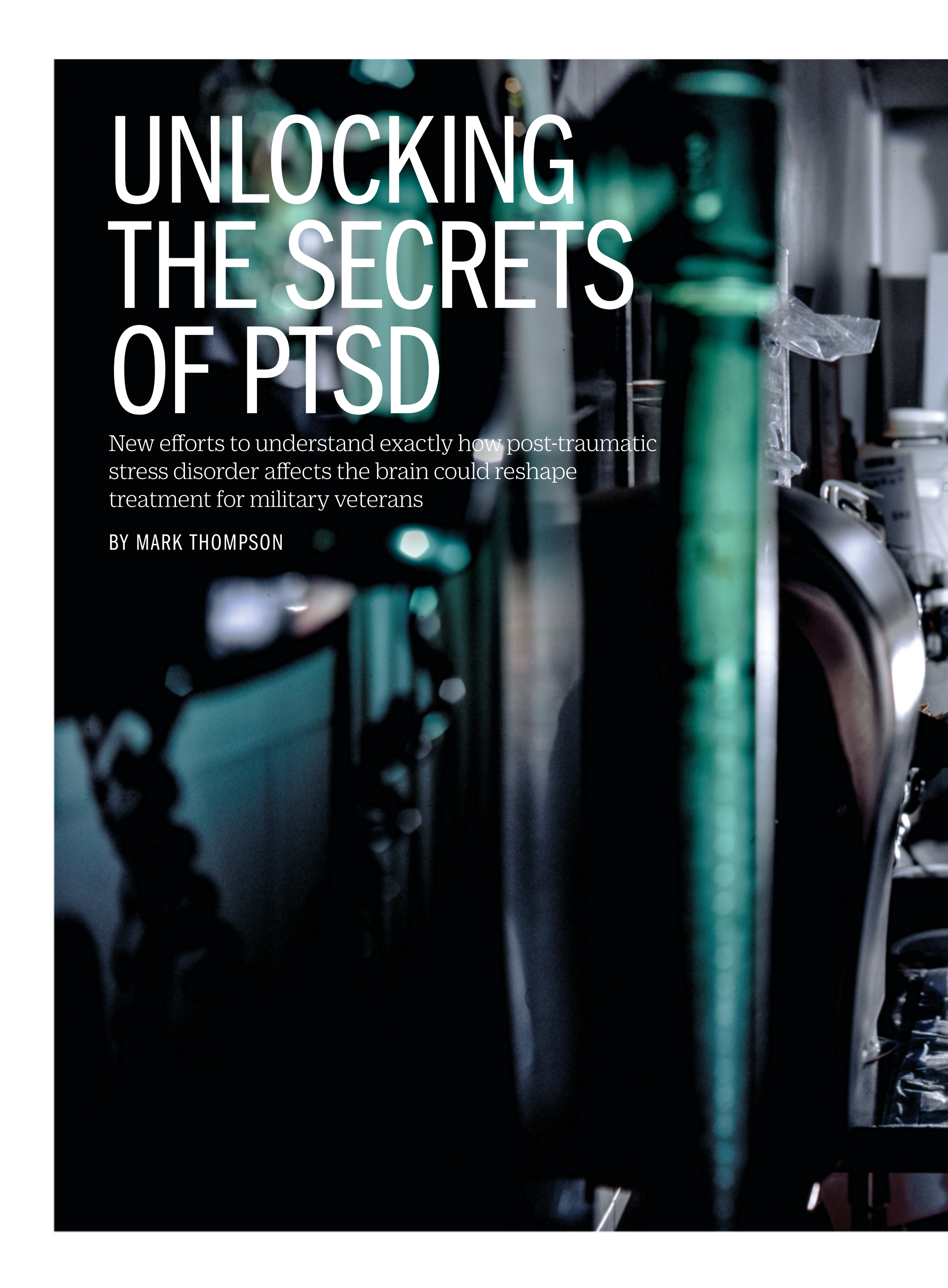
Still, the 24/7 slew of push notifications and distractions is seemingly impossible to ignore. “It's right there in your pocket, and it's buzzing every few seconds,” Primack says. With this comes the constant internal nagging to check those notifications. “That is the kind of thing that really can have a much more dramatic effect on overall stress and anxiety.”

Stress can also come from our tendency to measure ourselves against what we see on our newsfeeds, which is often just the best parts of other people's lives. “People are so able to curate various personae that they develop and maintain online,” Primack says. Social comparison is hardly a new idea, he says, but social media's distortion of how we view ourselves and others online can exacerbate it.

Yet the case of social media and stress may not be entirely grim. In the Pew Research survey, 40% of respondents who believed social media had a positive impact said that was because it allowed them to connect with others. For users experiencing loneliness or isolation in real life, Primack says, social media “very well might be a lifesaver.”

After spending too much time scrolling through Instagram stories and Facebook highlights, one may be tempted to go completely off the social-media grid, but Twenge recommends simply setting limits. A 2018 study in the *Journal of Social & Clinical Psychology* found that when college students limited their social-media use to 10 minutes per platform (Facebook, Instagram and Snapchat) per day, they showed significant reductions in loneliness and depression. Additionally, Primack and his colleagues published a study in 2018 in the *American Journal of Health Behavior* that divided participants into five groups of increasing social-media connectivity: Unplugged, Concentrated Dabblers, Diffuse Dabblers, Connected and Wired. The Connected and Wired groups had the highest risk for depression and anxiety, while the more moderate groups showed no association with these feelings. “It's when use becomes excessive that the negative outcomes start to show up,” Twenge says.

Moderation may be key to staying connected while combating social-media-induced stress. “Just limit the amount of time that phone's in your hand and limit the amount of time you're on social media,” Twenge says, “so you can have time to notice the world around you, talk to people face-to-face, get enough sleep and do all those other important things.” □



UNLOCKING THE SECRETS OF PTSD

New efforts to understand exactly how post-traumatic stress disorder affects the brain could reshape treatment for military veterans

BY MARK THOMPSON



Ann McKee, a neuropathologist who runs the VA brain bank in Boston, is researching the complex causes of PTSD.



DEEP INSIDE A BOSTON VA HOSPITAL, about two miles south of Fenway Park, 15 gray freezers are set at a constant temperature of -80°C . The chill protects the precious contents: samples belonging to the nation's first-ever brain bank for post-traumatic stress disorder (PTSD). There, scientists are dissecting the brain tissues by shaving some into translucent slices resembling the pickled ginger served with sushi and turning others into chemical soups. They're becoming fodder for researchers trying to better understand what exactly goes wrong—at the cellular level—in the brains of people saddled with trauma.

The payoff could be immense. Perhaps 500,000 U.S. troops who served in the wars in Afghanistan and Iraq over the past 16 years have been diagnosed with PTSD. The toll can be enormous. Without adequate treatment, PTSD can ruin lives and destroy families.

The trouble for these veterans is that there is a dearth of adequate treatments, and what works for one person might not work for another. That's in part because when it comes to PTSD, there's still a lot that experts don't understand. Which is where the brain bank comes in. Scientists hope that investigating brains that once belonged to people with PTSD could yield important biological insights to help those still living with the condition.

"The burden of PTSD in service members who have been deployed in support of Operation Enduring Freedom in Afghanistan since 2001 and Operation Iraqi Freedom since 2003 is staggering," the National Academy of Sciences reported in 2014. And while the U.S. spends \$3 billion per year to treat the disorder in military veterans, just how that treatment is administered is uneven at best. Through the investigation, the report's authors discovered that some veterans were given treatments with scant evidence of their effectiveness. It's a telling reminder that the government tends to be far better at deploying soldiers than caring for them when they return.

In the case of PTSD, that's not entirely the government's fault. Though we have known for more than a century about the emotional wounds combat can inflict, we still don't fully understand the effects war has on the brain. There has long been debate over how much of PTSD is caused by physical changes in the brain and how much is tied to

emotional responses to stress or trauma.

"We don't know the structural changes associated with PTSD because we haven't had this kind of brain bank before," says Ann McKee, a neuropathologist at Boston University who oversees the PTSD brain bank. "We've been diagnosing PTSD based on clinical symptoms, but we have not systematically characterized the pathology underlying this disorder."

McKee has studied the brain for decades. She did groundbreaking work on a degenerative brain disease caused by repeated head trauma that's commonly seen in football players and boxers. The PTSD brain bank (which now includes six VA and academic medical centers) has samples from more than 250 brains that are being studied for clues about the biological roots—if any—of PTSD.

Those insights could prove life-changing for veterans with PTSD as well as countless civilians who are haunted by trauma caused by emotional and physical abuse, rape, violent attacks and serious accidents. Those who seek help are usually sent to group or individual therapy or both. Many are prescribed potent medications, ranging from antipsychotics to antidepressants, in a search for a drug cocktail that may bring peace of mind. The uncertainty of what will work best for whom can make treating PTSD as much art as science. And since the consequences of not treating PTSD can be so dire—substance abuse, increased risk of suicide—refining the science is critical. That's why so much hope is resting on those freezers in Boston.

"There's kind of a desperation to get better treatment," says Alex Lemons, a Marine veteran from Salt Lake City who has wrestled with PTSD since the first of his three Iraq tours, in 2003. "This should have started decades ago."

AS OLD AS WAR

PTSD CAN BE TRACED BACK TO ANTIQUITY. IT WAS called "soldier's heart" during the American Civil War, became "shell shock" in the First World War, and "battle fatigue" during the Second. It morphed into "operational exhaustion" in Korea and PTSD only after Vietnam, when the American Psychiatric Association added the term to its list of recognized mental disorders.

In a cruel twist, improved battlefield medicine has reinforced the ranks of members of the military with PTSD. With fewer troops dying from once fatal



PTSD investigators are studying thin slivers of brain tissue for evidence of physical changes.

physical wounds, more have the bittersweet blessing of reliving their combat memories. Among deployed troops, PTSD diagnoses grew by 400% from 2004 to 2012. The National Academy of Sciences report estimated that up to 20% of the 2.6 million U.S. men and women who served in Afghanistan and Iraq may have it. In 2011, 1 of every 4 veterans of the post-9/11 wars who sought help from the VA suffered from a mental-health condition (PTSD, depression and traumatic brain injury being the most common).

Some of that increase is likely due to changes that have broadened the diagnostic definition of PTSD. But most experts agree that the number of people who receive a PTSD diagnosis is far lower than the actual number of cases. That's in part because the condition can be tricky to identify. Symptoms may appear soon after a traumatic event, or they may lurk until something—a new war, a flashback from an old one, something else altogether—rouses them from their torpor.

The severity of injuries also drives up PTSD rates: 8% among those with no wounds, 13% for those with penetrating wounds and 29% for those who experienced blunt-force trauma. Ground-pounding soldiers and Marines have PTSD at more than double the rate of sailors and airmen. And the condition is the third most common service-connected disability, after hearing loss and tinnitus.

While PTSD is not limited to the armed forces—victims of all manner of trauma experience it—only veterans suffer from PTSD because they did their government's bidding. This is why some leaders in the field have long argued that it's the government's responsibility to invest in more meaningful research and treatment for people with PTSD.

For years, doctors have been pushing for a government-backed brain bank to study PTSD, pointing to the important research breakthroughs from the more than 50 brain banks in the U.S., many privately funded, for maladies like Alzheimer's and depression. "We have favored getting a brain bank going for a long time, but nobody in government seemed interested," recalls Richard Weidman, the executive director of policy at the nonprofit Viet-

nam Veterans of America. "They don't want to pay for PTSD."

Matthew Friedman ran the Department of Veterans Affairs' National Center for PTSD in White River Junction, Vt., from 1989 to 2013. In 2004 he wrote that increasingly sophisticated functional MRI imagery revealed a "neurocircuitry of fear and anxiety" inside live human brains. Figuring out why neural networks crank up so high in those with PTSD, he argued, requires methodical brain dissection and analysis. In other words, a brain bank.

Yet neither the Pentagon nor the VA pushed for its creation, and neither, when they were asked by TIME, could explain why. "The problem," Friedman says, "was getting secure funding."

That finally changed in 2014, when Vermont Senator Patrick Leahy, a senior Democrat (now the vice chairman) on the Appropriations Committee, added \$1.5 million to the federal budget to create the VA's Leahy-Friedman National PTSD Brain Bank. "We spend a lot of time, money and effort getting men and women ready to go to war," Leahy says. "I've always felt that we ought to devote more attention as well to helping them when they come home."

HUNTING FOR THE SOURCE

THE BRAIN HAS LONG BEEN A mystery. Its electrical impulses and biochemical reactions, sealed inside the skull, run both body and mind. Their interplay, wrote Charles Sherrington, a Nobel Prize-winning early-20th-century brain researcher, is "an enchanted loom where millions of flashing shuttles weave a dissolving pattern, always a meaningful pattern, although never an abiding one, a shifting harmony of subpatterns."

PTSD disrupts those harmonious interactions among the brain's 100 billion cells, generating symptoms ranging from hypervigilance to depression to sleeplessness. Its insidious and multiple manifestations (there are up to 636,120 symptom combinations, two psychologists calculated in 2013) make PTSD especially vexing to treat.

"PTSD evolves based on the cultural conditions of the people who suffer through it," says David Morris, a Marine veteran who chronicled his condition in the book *The Evil Hours: A Biography of*

Up to 20% of the 2.6 million Americans who have served in Afghanistan and Iraq since 9/11 may have PTSD.

Post-Traumatic Stress Disorder. “The neuroscience for PTSD is less clear than it is for manic depression or Alzheimer’s.”

At the brain bank in Boston, McKee and her team are digging into some of PTSD’s biggest questions. Why are some people more vulnerable to it and some more resilient? How much of the way we react to any traumatic event is the result of biological factors? How much is environmental?

Much of the initial research now underway has involved brains from Baltimore’s Lieber Institute for Brain Development, a nonprofit that has more than 3,000 brains stockpiled for research into neuropsychiatric disorders. The PTSD brain bank has also set up a website where veterans are able to volunteer their own brains for study after they die. More than 90 have done so. “I expect the next two years will generate some groundbreaking papers looking at the influence of genetics on PTSD,” says Russ Huber, director of the PTSD brain bank, “as well as a better understanding of the biological mechanism behind the disease.”

The government has been paying Lieber about \$20,000 per half-brain, or hemisphere, to defray the costs of collecting, preserving and recording their histories. “It includes all of the vital structures of great interest to PTSD investigators, especially the hippocampus and the amygdala,” says Thomas Hyde, Lieber’s chief medical officer, referring to parts of the brain linked to emotions and memory.

Researchers are using imaging studies of live brains as a road map. “Certain sections of the brain will show an increased blood flow. Others will show a diminished blood flow,” Friedman says. “Certain sections of the brain will be more responsive to cer-

tain kinds of chemicals, and vice versa.” Animal studies, he adds, reveal “very exciting” alterations in neural connections after extreme stress.

Documenting the response is key, since charting what’s going wrong is the first step to fixing it. “Memory, activation of fear circuits and anxiety circuits seem to be overly active in people with PTSD,” Hyde says. “If you can understand that chemistry, then you might be able to develop better drugs to treat it.”

The brain bank will fuel PTSD research across the nation, with scientists at other institutions borrowing brain samples for their own work. And the bank’s benefits could extend well beyond vets: PTSD can affect anyone who experiences trauma, from bad falls to crimes such as robbery or home invasion. In fact, many experts believe that the sudden loss of a loved one or an abusive or even negligent childhood can also lead to PTSD. An estimated 6.8% of Americans will suffer from it at some point during their lives.

Those who have experienced PTSD are cheering the brain bank’s work. Jim Doyle spent 1969 in Vietnam as an Army infantryman and struggled with PTSD for 15 years. “PTSD is real. It’s not somebody trying to scam the system. It’s not people who are lazy. It’s not people who are just doped up,” says Doyle, of Fresno, Calif. He’s hopeful that the brain bank means that the next generation of soldiers won’t need to wage a second war when they come home.

“Maybe they’ll be able to find the physical manifestations,” Doyle says. “That way, the next guy in the next war won’t have to go through years of fighting himself, and everyone around him, because he’s not sure what’s going on inside his own head.” □

HOW TO GET HELP FOR PTSD

If you are suffering from post-traumatic stress disorder, there are resources available to help. Your best bet is to start with the U.S. Department of Veteran Affairs’ National Center for PTSD, which provides help finding the best treatment for you (including psychotherapy and medication), information on how to navigate benefits and claims, and several mobile apps that can help those suffering from trauma, as well as their families. Information is available online at ptsd.va.gov. In the event of a crisis, call



the National Suicide Prevention Lifeline at 1-800-273-8255, then press 1 to reach the Veterans Crisis Line.

The National Institute for Mental Health (part of the National Institutes of Health) provides information and tips about treatment and therapies for people with PTSD (including those not in the military who have survived natural disasters, violent crimes and other devastating events) as well as booklets and brochures and links to additional resources. Search “PTSD” at nimh.nih.gov.

THE SABBATH ANTIDOTE

Even if you aren't religious, taking a day off every week to completely unwind can bring emotional and spiritual rejuvenation

BY STEVE LEDER



EMAILS NAGGING US AT ALL hours. The phone buzzing, ping-pong, blinking and ringing everywhere—in the car, on the plane, at the table. Office stress. Market stress. Commuting stress. We hit our sales goal, we raise the goal. We get one promotion, we aim for the next. There are errands to run, commitments to keep, family and friends who need us. There's housework, homework and bookkeeping. And to top it off, 24/7 coverage of an increasingly uncivil, violent world whose politics are often coarse and divisive. It's no wonder stress-induced irritable bowel syndrome, heart disease, obesity, diabetes, headaches, depression and anxiety are tearing many of us apart . . . As Abraham Joshua Heschel put it in his famous book *The Sabbath*,

“It is as if the forces we had conquered have conquered us.” He wrote those words in 1951. Life was stressful then, and it's hard to argue it is any less so now.

Heschel attributed much of the stress we feel to the inordinate amount of time we spend immersed in the muck of our own material struggles and the world's problems, versus how precious little time we spend nourishing our inner, spiritual lives. Even those of us who find our careers to be enormously fulfilling can become victims of a cruel syndrome wherein the more time we give over to work and our many other responsibilities, the more our spiritual lives atrophy. Take it from a rabbi (me) whose vocation is to dwell and enlighten in the realm of the spirit and yet, like many in the clergy, spends most of his time on meetings, memos, budgets, fundraising (and more fundraising), committees (and more com-



Even if you love your job, it's important to take time to relax, unplug and escape the stress of daily life.

mittees) and meeting other people's spiritual needs. I preach and teach about the importance of family. But so many thousands of times I have left my own in order to tend to others'. Sometimes I am able to really pray on the pulpit, but most times I am worrying about my sermon, whether or not the organist will hit his cues and hoping the bar mitzvah boy doesn't yak up his breakfast from nerves.

Don't get me wrong, I love my work—and so did Heschel, who was a prolific writer, lecturer and activist. We all have to make a living and work hard to do so, and we all have to live in the world of responsibilities. Yet there is a way to transcend that world, at least one seventh of our lives. It is a wise and ancient antidote to the stress of modernity: a day of rest.

THE FIRST TIME the word *holy* is used in the Bible is not in relation to a thing; not a mountain, not a temple, not a person, not a text. Instead, the word *holy* first appears in relation to a day. "Then God blessed the seventh day and made it holy." It is time, not object, that is holy. Working, creating and imposing one's will upon nature six days a week is enough. Even God had to stop sacrificing time for stuff one seventh of the time. God knows, if you work and worry and only care for others seven days a week, you are nothing but a rich, well-meaning slave.

So much that defines the Sabbath for Jews is what we refuse to do on that blessed day. When the ancient rabbis created the list of Sabbath prohibitions, they defined 39 different categories of work that were forbidden. The common denominator is that the categories all involve ways in which we impose our will on the world. The ways we tear, cut, hammer, burn, grind, knead, thresh, spin, slaughter and demolish; all the weekday ways we forcefully shape nature for our own purposes. The Sabbath is the day on which we stop trying to shape nature and allow nature to shape us. Its glory is created *via negationis*—by ceasing to create. The power of the Sabbath reveals itself in the way of a stone sculpture, whose power emerges by what was removed and chiseled away to reveal the beautiful image within.

The religiously observant do not spend money on the Sabbath. So there is no acquiring, no searching for parking at the mall, no standing in line at checkout counters and, ideally, no thought or power given over to our hunger for things. We also do not use cellphones, email or social media or watch TV.

We are also expressly forbidden to "kindle a fire"

on the Sabbath. For our ancestors, starting a fire required great physical labor, and the Sabbath is a day of rest for the body and mind. But I have always understood this to mean we should not only refrain from arduous tasks but also refrain from igniting fires among us and the people we love: no bickering, no gossiping, no yelling, no swearing, no sniping. The Sabbath is the day on which self-righteous indignation must wait until tomorrow.

For those of us who take these prohibitions seriously, it is amazing to see and to feel the delicate beauty, grace, depth and meaning that thrive in the absence of conflict; the majesty of what is possible in life when we do something other than work, run errands, drive carpool, pay bills or argue.

For Jews, the Sabbath begins each Friday evening. Such a beautiful thing, a day that begins at sunset, attuning us first to nature's glow. Next, a quiet prayer over candles, wine and warm bread, then the blessing of children with ancient words in the glow of those same candles, and dinner with family and friends. Often there is a thoughtful teaching of eternal wisdom. It is the night each week when the tradition encourages spouses to make love. Then those who adhere to the Sabbath wake to a day spent in prayer, long walks and talks. It is time spent savoring time. A truce in the war for more things. A day devoted to being better, not better off.

When I give talks in a room full of people about the importance of taking the Sabbath more seriously, I often begin by asking all of the sex addicts in attendance to raise their hands. No hands go up. Then I ask the same of all the alcoholics, gambling addicts, pillheads and potheads. Again, no hands. Next, I invite all the racists, homophobes, sexists and bigots to fess up. No one ever takes the bait. Despite the fact that there are many people with at least one of the above traits in the room, they do not raise their hands because at the very least they know their demon is nothing to be proud of. But then, when I ask all of the workaholics in the room to come clean, there is laughter as many hands shoot up with a perverse sort of pride. Workaholism is the last acceptable ism in our society. And it is killing us.

AFTER ALL THE workaholics raise their hands, I ask everyone in the room if they would like an additional seven and a half weeks of vacation each year to help reduce their stress. Everyone does. I remind them that there are 52 weeks in a year and that if we take



Photos of family, friends and cherished moments are enduring reminders of what is most important and what we should prioritize in our overly complicated lives.

a Sabbath day each of those weeks, it amounts to seven and a half weeks of vacation from the madness. Simple math that will change your life.

Muslim, Christian, Jew, Buddhist, Baha'i, humanist, secularist—we can each create our own sort of Sabbath. We can each live a seventh of our life with less stress and more splendor. You really can spend the day in your pajamas. Unplug. Share a delicious meal with people you love. Walk, breathe, stretch, garden, play and remove what obscures the beauty of life. Stop grinding, threshing and spinning. Kindle no fires. Let your away message read: "Today is my Sabbath. I am transcending the muck of the world—nurturing my spirit. Stress me out tomorrow instead."

SOMETIMES, EVEN A rabbi needs reminding of what's really important. The recent round of wildfires in Southern California did the trick. A special police bulletin informed us that our neighborhood would be the next to evacuate if the fires continued moving eastward. We had time to pack two suitcases. In one we put supplies for our dogs. The other we packed full of family pictures and home DVDs. When the heat is on, it's people, pets and pictures that matter most. If you think about it, it doesn't take long to figure out that pictures, despite having no real material value, are so priceless because they represent

moments in time with the people we love.

There's the one of my dad with his sparkling blue eyes, wide smile, baggy pants and a cowboy hat, eating a slice of grapefruit at a roadside stand. It reminds me to find joy in the simplest of things. There's another of my mom, hovering over an enormous pot of soup with a spoon the size of a paddle. It carries me back to how warm she kept us all on those cold Minnesota nights. A photo showing my son's freckled face bobbing in the ocean, and my daughter's cornrowed, beaded hair puts me on vacation with them again in Mexico, feeling free and calm. The honeymoon beach shot of my wife reminds me how long and beautiful our journey has been. There is a sacredness to time that errands, meetings, memos, Instagram likes and all the money for all the things in all the world will never give us.

The Sabbath is an ancient answer, a wise and powerful antidote to the necessary indignities, cravings and predations of our frenetic lives during which we are so terribly busy yet feel so terribly empty sometimes. Seize your own Sabbath to relish the most sacred, finite and beautiful of all blessings—time. □

Steve Leder is the author of More Beautiful Than Before: How Suffering Transforms Us and is the senior rabbi of Wilshire Boulevard Temple in Los Angeles.

CREATIVE SOLUTIONS

Artistic expression, either on your own or as part of therapy, can foster an improved sense of well-being

BY HALLIE LEVINE



FOUR YEARS AGO, LORI LITE was coping with the stress of dealing with aging parents while juggling family and work demands when she suddenly had the urge to begin painting. “I felt like painting swirls, swirls and nothing but swirls, so I decided to sign up for a painting class,” says Lite, who is in her 50s and lives in Atlanta. She quickly discovered that the structured class was making her more anxious. “I tend to be a bit of an overachiever and a perfectionist, so I couldn’t just relax and enjoy the sessions,” she remembers.

Instead, Lite decided to set up a small easel in the windowed corner of her kitchen and began simply painting swirls. The results were immediate—and

magical. “I began painting these swirls in soothing, earthlike colors such as brown, beige and gold while looking out at the woods just beyond my window,” she says. “For the first time in weeks, I felt calm.” Since then, she’s made a point to continue painting for 10 to 15 minutes every day. “It was something I was drawn to instinctively,” she says. “I’m not a great artist, but I just put on some relaxing music and let my paintbrush guide me, and I can feel the stress melting away.”

It probably comes as no surprise that creating art can be therapeutic. For tens of thousands of years, humans have gravitated toward expressing their deepest emotions through paintings, sculptures, drawings and other media. “From the time we’ve been able to communicate with one another, we have created art,” says Steven Schlozman, a co-director of the Clay Center for Young Healthy Minds at Massa-



chusetts General Hospital and an assistant professor of psychiatry at Harvard Medical School. “It’s a way for us to express the inner workings of our own mind, so we can process them and find healing. And it’s a way for us to find a connection, both with other humans and with the world at large.”

Increasingly, research also shows that it’s an effective way to deal with stress. People who make a single work of art experience significant reductions in levels of the stress hormone cortisol, according to a Drexel University study published in 2016 in the journal *Art Therapy*. Researchers had 39 adults between the ages of 18 and 59 create an art project from either clay, felt markers or collage materials. Their saliva was swabbed immediately before and after the 45-minute session. The result: almost three quarters had lower cortisol levels at the end. “What was particularly important about the study was it didn’t seem to matter whether or not subjects had previous art experience—everyone seemed to get just about the same level of benefit,” explains Cathy Malchiodi, director of the Trauma-Informed Practices and Expressive Arts Therapy Institute in Louisville, Ky. There’s even some preliminary evidence to suggest that art therapy can help with mood disorders such as depression. One 2017 study done at the University of Gothenburg in Sweden found that subjects with severe depression who underwent 10 hour-long treatment sessions in which they created a picture of how they were feeling with watercolors or crayons showed significant improvement in their symptoms compared with a control group.

HOW ART HEALS

IT’S SOMETHING WE INSTINCTIVELY KNOW AS kids: whether it’s creating a lopsided animal with Play-Doh or destroying walls with finger paint, art in all its messy stages can be truly therapeutic. “Art forces you to tap into the right side of the brain, which is in charge of emotions and creativity,” explains Susan Albers, a psychologist at the Cleveland Clinic. “We spend most of our days using our left brain, which focuses on words and worries and thinking things through. As a result, diving into the right brain is almost like a vacation for your mind.”

There’s another key reason art relaxes: it promotes mindfulness, which in turn reduces levels of stress hormones. “When you’re forced to be present in the moment, it really slows your entire body down,” Schlozman explains. “Your heart rate, your blood pressure, even your breathing.”

Enter art therapy, a hybrid field that combines art and psychology. Its goal is to help patients develop self-awareness and explore their emotions, Malchiodi says. The term itself was coined in 1942 by English artist and writer Adrian Hill, who discovered that activities such as drawing and painting lowered stress levels among tuberculosis patients. Since then, art has been used to treat people with conditions as diverse as cancer and PTSD. “People can more authentically express what is going on inside of them through art,” explains David Puder, a psychiatrist at Loma Linda University Behavioral Medicine Center in Yucaipa, Calif. “So many of us have psychological defenses that make it hard to express things verbally. But by creating something, they can relive an experience or convey an emotion that they might not be able to talk about with a therapist.”

One 2015 study funded by the National Institutes of Health found that art therapy helped alleviate anxiety and depression among cancer patients. And a 2016 review published in the *Journal of Military and Veterans Health* concluded that war veterans with PTSD who received some type of art therapy experienced a significant reduction in symptoms. “When cancer patients come into my classroom, they’re a little hesitant, but once they get in here, it’s truly amazing what happens,” says Cheri Hunt, an art instructor at LivingWell Cancer Resource Center at the Northwestern University Feinberg School of Medicine in Chicago. “They’re working in a medium that they’re not used to, and it lets them let go of worry and allows them to find some self-reflection and express their inner feelings and thoughts.”

A structured art therapy session itself—either group or individual—usually starts with participants checking in with their therapist to provide a baseline of how they’re feeling. They then perform the chosen activity, which can be anything from painting to sculpting to making collages. The session wraps up

Creating art promotes mindfulness, which in turn reduces levels of stress hormones.

with patients checking back in with the therapist to discuss their artwork and the emotions it evoked.

HOW TO HARNESS YOUR INNER PICASSO

IF YOU'RE CONSIDERING ART THERAPY, IT'S IMPORTANT to find a provider who is a registered art therapist (ATR). This ensures that they have at least a master's degree in art therapy (or a counseling field plus graduate coursework) and have gained experience under the supervision of a mentor. You can find a credentialed therapist via the Art Therapy Credentials Board website (atcb.org).

But art therapy itself can be expensive—anywhere from \$85 to \$150 a session—and isn't always covered by insurance (you have a better chance if your therapist is both a psychologist and a certified art therapist, says Malchiodi). The good news is that you can reap many of the benefits of art therapy in the comfort of your own home. "It's like exercise—if you do 15 minutes a day, that's great, but if you can do 45 minutes, it's even better," says Malchiodi, who usually recommends that her clients try to do 45 minutes three times a week. Here are five easy ways:

Start an art journal. Folks who have a hard time expressing their feelings in writing can take a large piece of poster board and literally draw pictures of their thoughts and experiences, recommends Praveen Injeti, an occupational therapist at Loma Linda University Behavioral Medicine Center. One ideal medium for this is pastels, or sticks made up of pure powdered pigment that look very similar to sidewalk chalk. "They have a great tactile feel, and you can easily blend colors together," he explains. "I have patients keep a journal for weeks or even months as a way to chart their feelings over time."

Doodle. Even an activity as simple as doodling when you're on the telephone activates your brain's reward pathway, according to a 2017 study published in the journal *The Arts in Psychotherapy*. When researchers had 26 participants complete three different art activities—doodling in or around a circle, free drawing or coloring in a mandala (a circular geometric pattern), they found that those who doodled had the greatest increase in blood flow in their brain's prefrontal cortex, the part of the brain that wires its reward circuit. "It's a great place to begin because it's something we all have experience with, and it's something that can be done easily," Malchiodi says.

Try an adult coloring book. If you swear you don't have an artistic bone in your body, an adult

coloring book can be a great way to start. "It's very repetitive, which in itself can be very soothing," explains Malchiodi. One good option is a book that features mandalas. When people drew or colored for 20 minutes, those who colored in mandalas reported the biggest decrease in anxiety levels, according to a study published in 2012 in the *Journal of the American Therapy Association*. "When you're just drawing, you have to stop and think about what you draw, but if you're coloring in a mandala, you really have to concentrate and focus, which in turn encourages mindfulness," Malchiodi says.

Create origami. The paper-folding activity has been shown to stimulate the brain's prefrontal cortex. Albers recommends hiding inspirational messages or a funny quote in the folds. "This way, you can pick up your masterpiece when you're feeling stressed, pull back a random fold, read the message inside and repeat or chant it to yourself to help you relax."

Rock it out. One way to enhance the benefits of art therapy, says Albers, is to combine it with forest therapy, a.k.a. spending time outdoors in nature. She often has clients go out to the woods to collect rocks and then has them paint them. "Painting is very soothing and relaxing because it's very rhythmic," she explains. The final step is to type or write up some sort of motivational quote or mantra and paste it on the rock. "This activity has the advantage of using both your left and right brain, which is important because both play a role in responding to stress," says Albers.

THE MOST IMPORTANT thing is to have fun with your project and not sweat the small details. "I've had patients make major breakthroughs working with finger paints and cheap paper," Puder says. "The key is to draw or paint or sculpt without thinking about it too much—it's OK to get messy and create something that's ugly. It shouldn't be perfect." Remember, this is for yourself and not necessarily for public display. Finally, turn off the TV, podcast or music. "You don't want to be doing something mindlessly—it's not like being on autopilot," says Puder. "You want to be present with what you're doing."

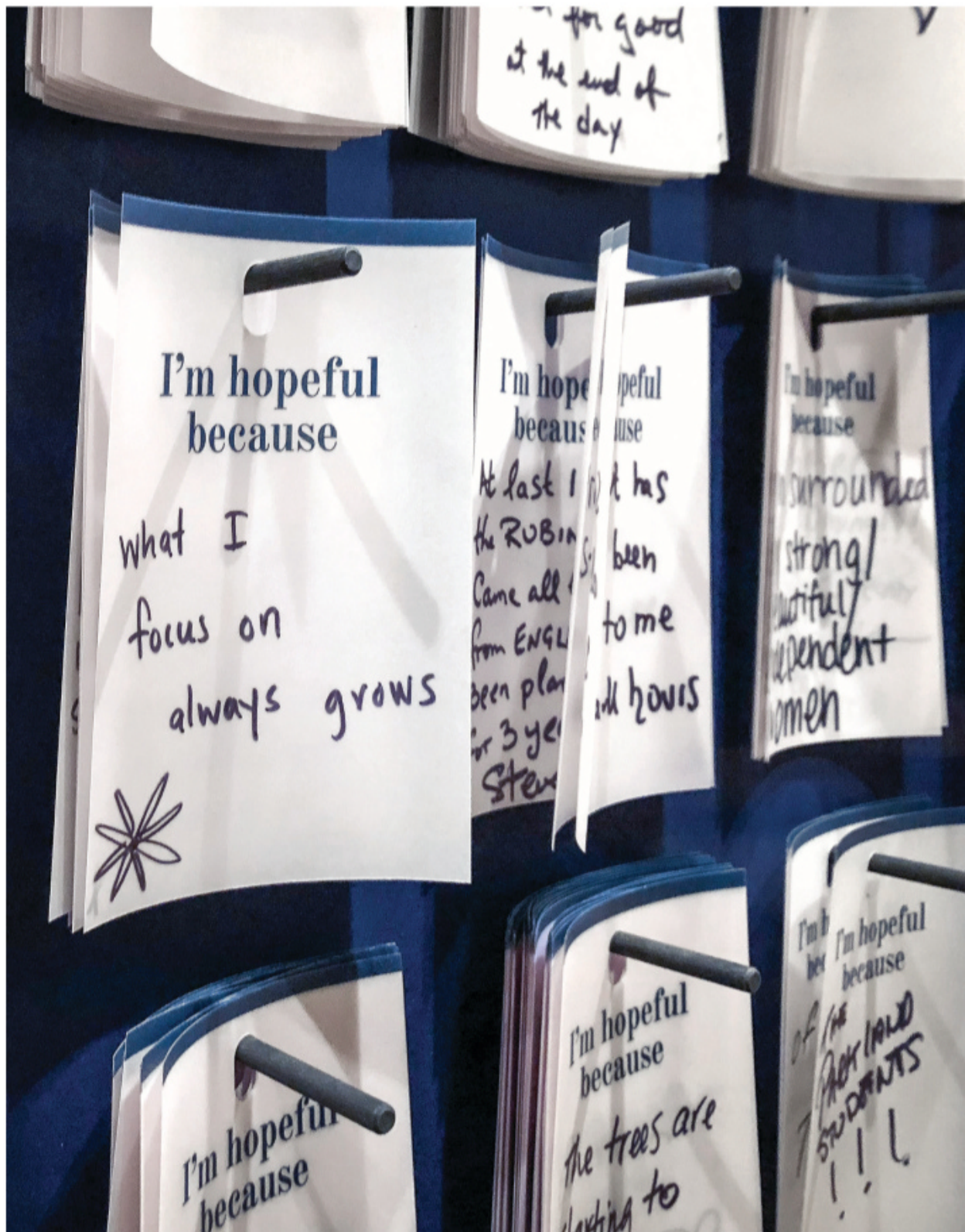
Lite agrees. Although she no longer paints every day, she still gets the same sense of joy whenever she takes out her color palette. "As soon as I pick up my brush, I'm back in the zone," she says. "I don't obsess about it. I choose colors that feel good to me, and as I create swirls I can feel the relaxation pouring through my body again." □

PUBLIC DISPLAY OF ANTICIPATION

It's said that misery loves company, but apparently so does hope. That was a driving theme of the 2018 art installation “A Monument for the Anxious and Hopeful” that artists Candy Chang and James Reeves staged at the Rubin Museum of Art in New York City. The ambitious project invited visitors to fill out cards and complete the sentences “I’m anxious because . . .” or “I’m hopeful because . . .” More than 55,000 responses covered a wall of the museum, and some of the more powerful responses for the anxiety cards included “Because things don’t always get better with time,” “I’m afraid of being yelled at online” and “I worry that my son will relapse.” On the hopeful side, encouraging responses balanced the scale with statements such as “I’m ready to fall in love again,” “People believe in my voice” and “I’ve survived all of my worst days.”

Clearly the artists had tapped into a need to share our fears and expectations. “We’re living through a uniquely unsettled moment of technological, political and social flux that affects each of us in personal, specific ways,” says Chang, whose work focuses on participatory public art. “As we each wrestle with our own private anxieties and desires for the future, perhaps it might offer some measure of reassurance to see the ways others are reckoning with tomorrow’s uncertainty. In these days of increasing anxiety, loneliness and tribalism, we believe creating local infrastructure for the soul is more important than ever.”

Chang and Reeves are working on archiving the responses in the hopes of eventually collecting them in book format. And they aim to stage the installation again in other locations. Says Reeves, “We hope projects like this one can help people feel less isolated or weird or broken when they see that everyone is wrestling with dark material.”—RICH SANDS



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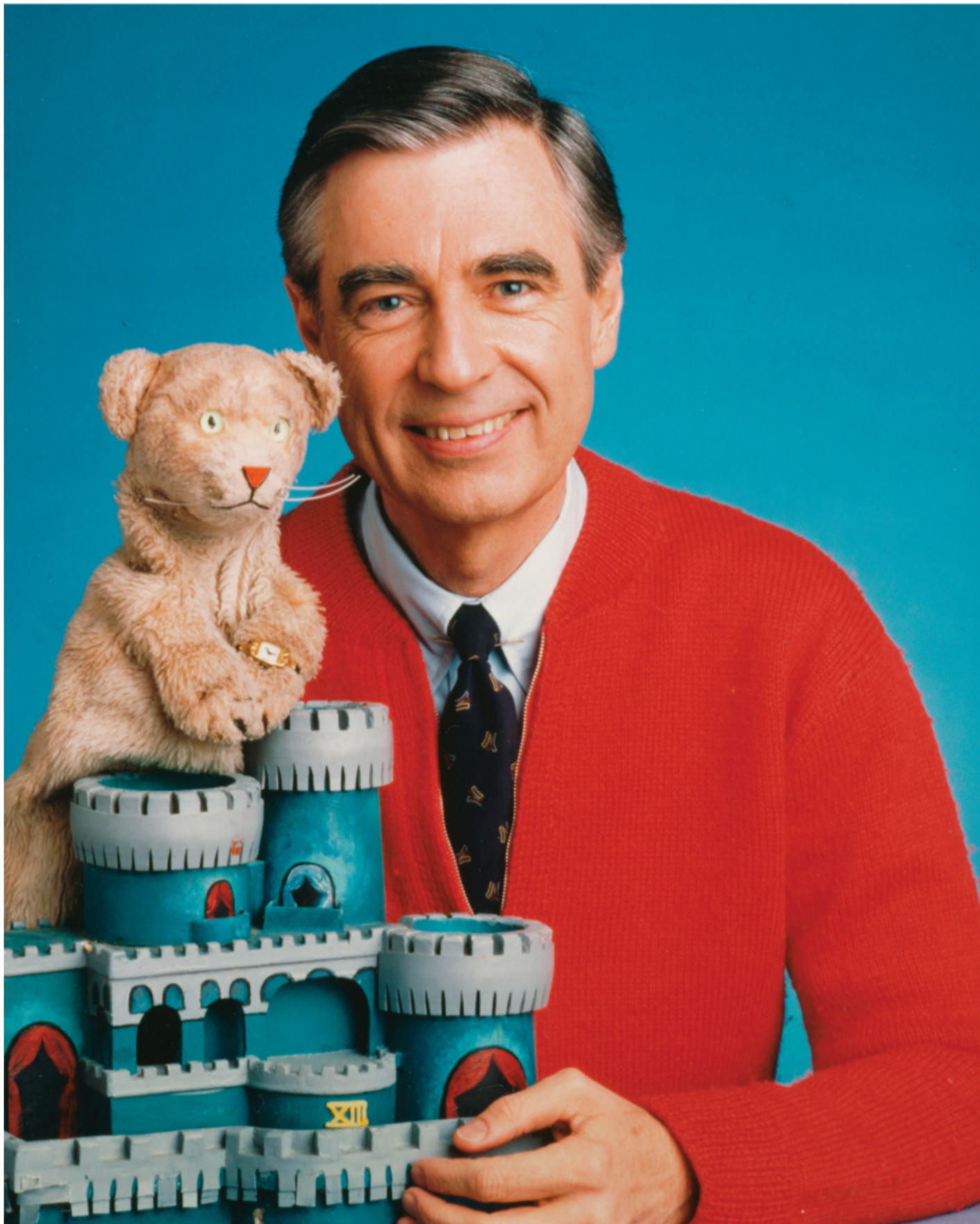
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LAST WORD



“In times of stress, the best thing we can do for each other is to listen with our ears and our hearts and to be assured that our questions are just as important as our answers.”

—**FRED ROGERS (A.K.A. MISTER ROGERS)**



Understanding Stress

Humans have been feeling and responding to stress since our earliest days. New science can teach us how to best handle those pressures, how to beat back anxiety and why some stress can be good for us.

