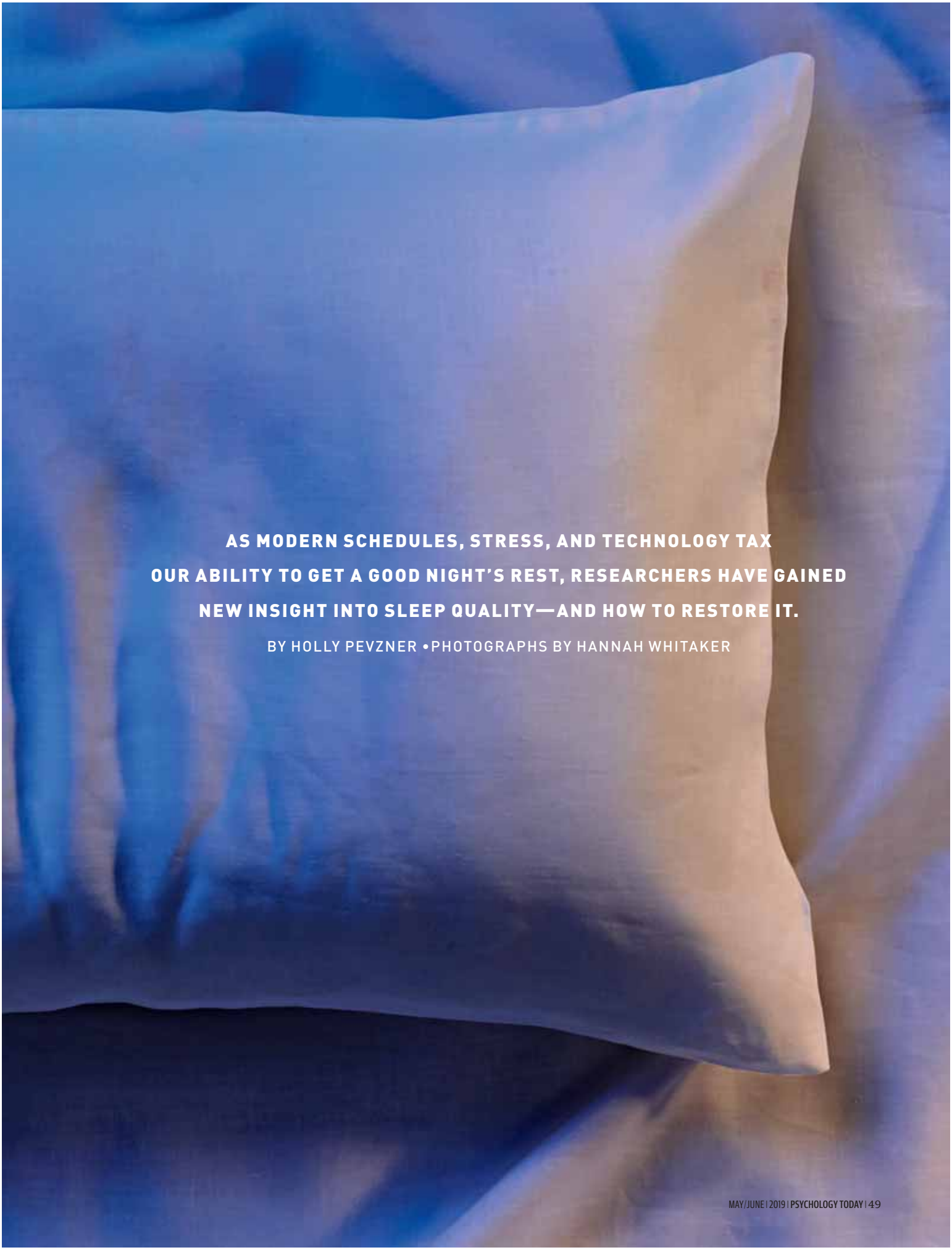
THE NEW SCIENCE OF SLEEP



AS MODERN SCHEDULES, STRESS, AND TECHNOLOGY TAX OUR ABILITY TO GET A GOOD NIGHT'S REST, RESEARCHERS HAVE GAINED NEW INSIGHT INTO SLEEP QUALITY—AND HOW TO RESTORE IT.

BY HOLLY PEVZNER • PHOTOGRAPHS BY HANNAH WHITAKER

WHY PEOPLE NEED REST and what happens to the mind and body during sleep remain enduring mysteries. But humans have intuitively grasped a connection between sufficient sleep and good health and emotional functioning. A wave of findings over the past two decades has established just how crucial quality sleep is. We now know, for example, that the effects on the body of accumulating a large sleep debt—the difference between how much sleep we need and how much we get—mimic some hallmarks of aging and can increase the severity of conditions like diabetes, hypertension, and obesity. And new research has found that in people experiencing sleep deprivation pain hurts more: Our pain threshold falls about 15 percent after just one night of insufficient rest. As such awareness has grown, though, so has anxiety among those who fail to get enough sleep, a group that includes at least one in three adults in the United States, according to the National Sleep Foundation's 2018 Sleep in America Poll. And yet, only 10 percent report prioritizing sleep over other goals like exercise and nutrition. That needs to change. Fortunately, we have the ability to recover from many of the effects of poor sleep. It starts with both an honest reckoning of how we may sabotage our evenings and a commitment to adopt strategies proven in the nation's leading sleep labs.

1 Know the Basics

Falling asleep as soon as your head hits the pillow is not proof that you're a good sleeper. In fact, it's more likely an indication that you're sleep deprived, says neurologist W. Christopher Winter. In general, it should take about 10 to 20 minutes for a person to drift off. But whether it takes 20 or 45, "you simply have to think it's too long for it to be too long," says Michael Perlis, director of the Behavioral Sleep Medicine Program at the University of Pennsylvania School of Medicine.

If you're not comfortable with how long it takes to go to sleep, first review your bedtime routine. Most people have heard the standard sleep hygiene advice: Make sure your bedroom is cool and dark. Use your bed only for sex and sleep. Avoid caffeine from mid-afternoon on. And avoid all screens for at least an hour before turning in. Our screens' melatonin-inhibiting blue light delays sleep latency by an average of 10 minutes, according to a 2015 Harvard study. Actually nodding off in front of a screen, as 61 percent of adults confess to having done, is a problem as well. "Light from the TV can go through your eyelids, so your brain still processes that you're being exposed to light," says Ken Wright, director of the Sleep and Chronobiology Laboratory at the University of Colorado Boulder. "We'd expect that this would lead to more fragmented sleep and more arousals throughout the night wherein your heart races or your brain waves speed up." These effects stave off reaching deep sleep, which research suggests is more refreshing than lighter stages.

Middle-of-the-night waking doesn't happen only to those who crash on the couch. But whether it occurs in the living room or in bed, the experience is not cause for panic. If it happens to you, just go with it. "Yes, it sucks that you're awake, but you need to get out of bed," Perlis advises. "If you lie in bed awake, you'll have a new problem: Your bed will become a conditioned stimulus for wakefulness." So stand up, move to another room, and do something you enjoy—not involving a screen. "Will you be awake longer? Yes. And that's good. You'll build sleep pressure to help you sleep better the next night," he says.

If occasional night-waking morphs into more regular sleep disruption, a sleep hygiene review will take you only so far. "It's my estimate that good sleep hygiene strategies will solve roughly a quarter of sleep issues," Winter says. "The best environment won't address intrinsic issues like sleep apnea and restless leg syndrome," conditions that affect 22 million and 12 million Americans, respectively. If two weeks devoted to improved sleep hygiene doesn't make a difference, he suggests contacting a sleep specialist.

Adults really do need seven to nine hours of sleep each night to ensure optimal physical and mental functioning. Those who think the rules don't apply to them, research proves, are simply wrong.

2 Reset Your Clock

All humans need sleep, but they don't all rest the same way. So-called night owls, for example, tend to be more awake and cognitively primed late in the day, while morning larks are the opposite. "We all have our own natural rhythm that tends to dictate the timing of biological activities like sleep, hormone release, even athletic ability," Winter says. True owls and larks make up about 50 percent of the population, a 2017 survey concluded.

With practice, natural night owls can change their inclination to better function in a 9-to-5 world. Our circadian rhythms are based on light, darkness, and the release of the sleep hormone melatonin. By controlling the first two, the third should fall in line to help reset one's clock. "Darkness signals your body to release melatonin and kick-starts the physiological process that promotes sleep, like lowering body temperature," Wright says. "Exposure to natural daytime light, especially early morning light, signals the body to release melatonin earlier in the evening." It doesn't necessarily take long for a body to begin to make the switch: Wright's own 2017 research discovered that individuals who spent a weekend camping, away from screens, fluorescent lights, and blackout curtains, found their melatonin begin to rise 1.4 hours earlier than usual. Those who camped out for a full week moved their melatonin release 2.6 hours earlier, in part because they were exposed to 13 times as much daylight as usual.

To retain a circadian reset, however, requires commitment: Individuals must stick to the new schedule and continue to invite exposure to bright natural morning light. For those whose schedules or homes don't allow access to the sunrise, a light box can help by mimicking natural light and spurring melatonin release, suggests Matthew Edlund, director of the Center for Circadian Medicine in Sarasota, Florida.

3 Focus on Weekly, Not Nightly, Sleep

There are minor variations, but in general, adults really do need seven to nine hours of sleep a night to ensure optimal physical and mental functioning—and most people who think the rules don't apply to them are simply wrong.

For a study published in 2018, researchers tracked the sleep patterns of over 10,000 subjects while also testing their cognition and memory. They found that those whose regular sleep fell in the seven-to-eight-hour range scored highest, regardless of age or gender, and people who consistently slept for either fewer or more hours were equally impaired. "Reasoning, problem solving, and verbal abilities were the most affected," says Conor Wild of Western University in Ontario, the study's lead author. "You might think you're functioning fine, but you're not at your best."

The long-term ramifications are scarier: For participants who reported

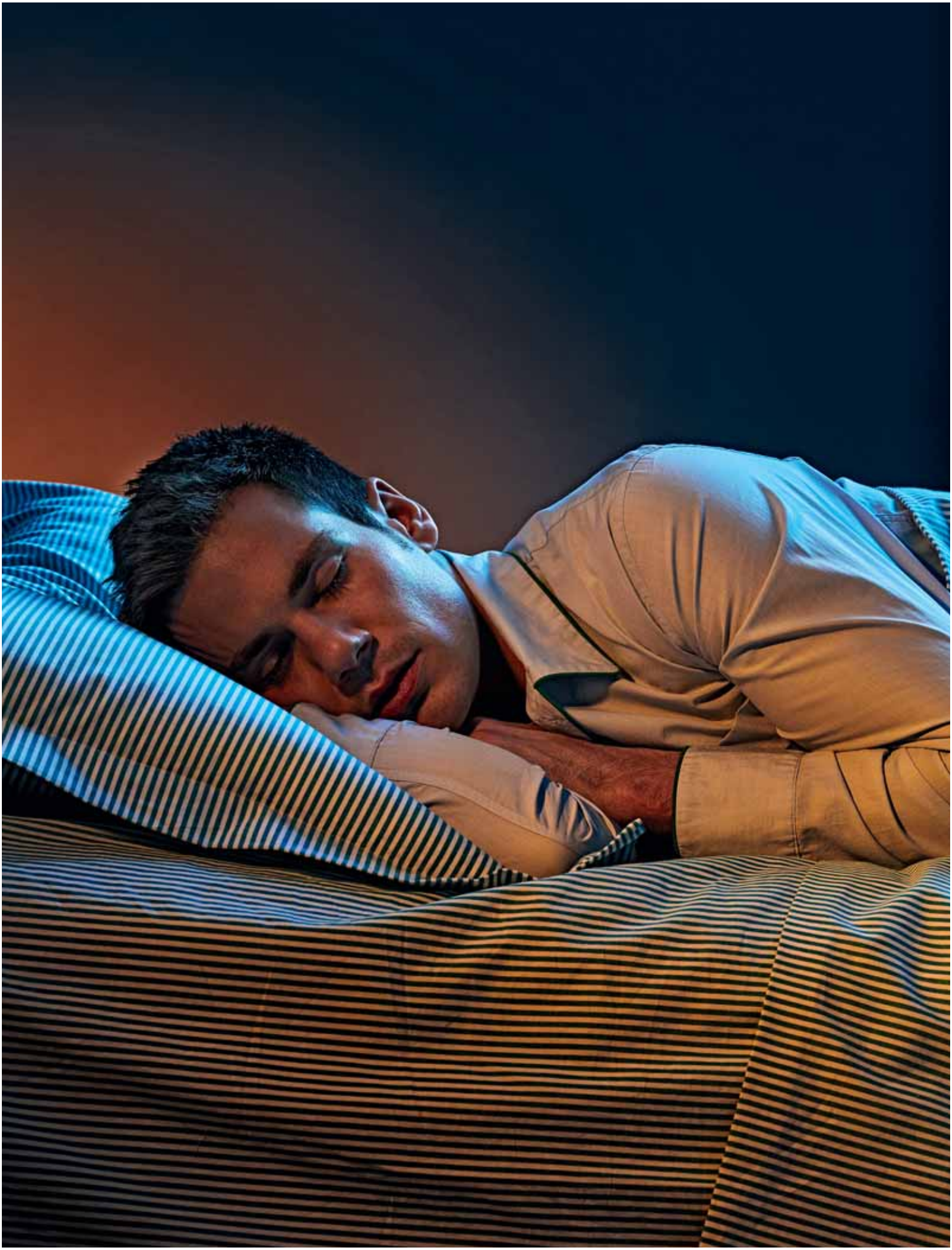
BUILDING A BETTER NIGHT

IN TRUTH, THE most common sleep difficulties are exacerbated by factors like illness or stress. But external fixes can sometimes help restore healthy sleep.

Aside from controlling the light, both natural and artificial, in your bedroom, a consideration of your sleep environment should begin under the covers. "A good mattress is incredibly important," says clinical psychologist Janet Kennedy, but most people don't have one. "Older mattresses break down and become uneven. They can't provide adequate support anymore, which often results in restless and inadequate sleep," she says. "Plus, they accumulate a tremendous amount of allergens over the years, which can further disrupt sleep." According to a 2015 study, most people wait 11 years to replace their mattress, but should make the switch after seven.

Weighted blankets have been gaining in popularity, and some experts say they're more than a fad. "They're great," says neurologist W. Christopher Winter, who has used one himself and recommends them particularly for patients with restless leg syndrome. "You know how swaddling babies helps them sleep, and how we like hugs? It's the same principle of providing comforting pressure." A 2015 report supports the notion, finding that weighted blankets helped individuals to settle down to sleep more easily and to sleep longer. "If you like it when the dentist puts on the lead apron before X-rays, give it a shot," Winter says.

Winter also recommends wearing a sleep-tracking bracelet that can record when you fall asleep and when you wake up and detect interrupted sleep. Ironically, he says, a primary benefit may be reassuring people who believe they're getting hardly any sleep— the phenomenon known as paradoxical insomnia. "For those who think they're not sleeping at all, it can lessen their anxiety and hopefully set them on a path to get more rest."



sleeping four hours or less for an extended period of time, cognitive test results declined as much as if they had aged eight years.

Think of sleep like the federal budget: One year, there may be a deficit; the next, if tax revenues rise, the budget may balance. But the accumulated debt, built over decades, may remain unchanged. When you have a short-term sleep deficit, it is possible to make up some of it: Just remain vigilant and don't stress over any single night. "If seven hours is your general number per night," Winter says, "you need to get 49 hours a week." If, say, a flight delay sets you back four hours, aspire to make it up over the next six days by sleeping in a bit or taking well-timed naps. In a longitudinal 38,000-person study, those who slept slightly fewer than optimal hours during the week and an extra hour or two on weekends lived as long as those who consistently hit their nightly target. Addressing the accumulated impact of chronic sleep deprivation, though, demands more committed change.

4 Get Age-Appropriate Rest

A 2-year-old requires up to 14 hours of sleep a night, and a 9-year-old as much as 12, while a middle-aged adult should function well with eight. Making sure kids get all the sleep they need is crucial: It's well established that inadequate sleep in early childhood affects brain development and socialization. And when tweens and teens get insufficient rest, the effects are felt in the amygdala and prefrontal cortex and can lead to a greater chance of engaging in risky behavior. High schoolers who slept less than six hours a night were twice as likely to use alcohol, tobacco, or marijuana as those who slept eight hours, according to a 2018 study, and were three times as likely to consider or attempt suicide.

The teenage brain is very much a developing brain and needs to be treated as such. "There's a big growth spurt in adolescents when about one-third of the neuroconnections in the brain die and reorganize in a rather radical way, which requires more sleep," Edlund says. "It's like when you get sick: You sleep more because you have to regenerate what was damaged by your illness."

At the same time, though, adolescents experience about a two-hour shift in the release of melatonin, preventing most from getting sleepy before about 11 p.m. This wouldn't be a problem if kids could adjust their schedules to fit with their shifting biology, but they can't: School starts at 8:00, and alarms typically go off by 7:00. "It's equivalent to an adult being woken up at 4 a.m.," says Wendy Troxel, a behavioral scientist at the RAND Corporation. "At 6 a.m., kids' bodies are still pumping out high levels of melatonin, making them extremely sleepy, lethargic, and often irritable."

Adults in their mid-to-late 20s have the most flexibility. "A healthy young adult is able to recover quite well from inconsistent sleep," Winter says. "You can abuse yourself and still go to work the next day and do pretty OK." But it doesn't last: By our 40s, we start to lose the capacity to recover quickly from inconsistent sleep.

It's often assumed that older adults require less sleep than others. That's not the case: People over 65 still need seven to eight hours a night. But they do face other changes. "Once people are no longer forced to follow a traditional workday or their kids' school schedule, they often do things at different times," Edlund says, "and their sleep architecture changes." Older people don't wake up at 5 a.m. because they need less sleep but because they may be eating dinner earlier than they used to, or napping more often, or getting less morning sun because they no longer commute.

And yet, nearly half of all older adults complain of difficulty sleeping. That's partly because sleep tends to become lighter and more fragmented with age, leaving us more susceptible to waking. Rates of apnea and insomnia tend to increase with age as well. But the primary threats to sleep later in life are physical and psychiatric illnesses and the medications used to treat them. "The worst thing you can do is assume your sleep issues are simply a byproduct of age," Edlund says. "If your sleep is suffering, it very well may be due to a treatable condition."

Over a four-year period, 100 percent of adults will have experienced acute, or short-term, insomnia.

5 Put Insomnia To Bed

The feeling that one is suffering from insomnia can be extremely stressful. When you've experienced reliable sleep without incident for decades, and it suddenly seems to vanish, it's natural to wonder why, and when, if ever, it will return. But acute, or nonchronic, insomnia—difficulty falling or staying asleep for three nights or more a week for at least two consecutive weeks but less than three months—is normal. "Over a four-year period, 100 percent of adults will have experienced acute insomnia," says Perlis, a finding based on his own 2018 research.

To understand why acute insomnia is so common, Perlis looks back to early

humans and the fight-or-flight response. If you believed that a bear, or an enemy, might attack in the middle of the night, your defense would hinge on your ability to stay awake, aroused, and alert. Most of us don't live in such peril today, but our bodies react the same way to stress, whether the threat is real or perceived. "And if you are under threat, what do you need?" Perlis asks. "More time to figure everything out. Acute insomnia is the gift of more time."

It may be hard to view disrupted sleep as a gift, but it carries at least one adaptive advantage. A 2016 study of rodents found that deprivation of rapid-eye movement (REM) sleep immediately following a stressful or traumatic event reduced PTSD-like symptoms. REM is the deepest phase of sleep, when most dreaming and memory consolidation is believed to occur. Perlis, who was not involved in the study, finds the results intriguing. "Maybe not all memories should be consolidated," he suggests. "Maybe there are some things you don't want to remember in detail, and acute insomnia helps."

Welcoming insomnia, though, is easier said than done, and the stress it brings can spur a cycle of anxiety: The less you sleep, the more you worry, and the more you worry, the harder it is to return to healthy sleep. "Insomnia is typically triggered by something in the body or in the environment, like an illness, stress, loss, or travel," says Janet Kennedy, a clinical psychologist in New York City. Ruminating over such episodes, she says, "leads to physical symptoms of hyperarousal, which can then lead to behaviors that undermine sleep, like spending too much time in bed or relying on caffeine during the day and sleep aids at night." The healthiest response is to remind yourself that sleep is variable, even from night to night. "Your sleep is a response to countless events and stimuli," Kennedy says. "A bad night here or there—or even a few—is normal even though it's not completely comfortable."

To manage worries, she suggests writing them down at bedtime: "Left to swirl in your mind, worries gain speed and continue indefinitely. Writing them down makes them concrete and finite. Once you have written them down, pick up a book—preferably fiction—and read until you can't stay awake."

Dreams don't exist to be interpreted and reveal hidden truths about your soul. Instead, time spent dreaming enables you to consolidate memories and regulate moods. Think "overnight therapy."

When you do experience acute insomnia, the best response is to do... nothing. Don't sleep in, don't nap, don't go to bed earlier. "If you try to compensate, you start to create a mismatch between sleep opportunity and sleep ability, and it's more likely you'll wind up with chronic insomnia," Perlis says. "Instead, let the sleep pressure rise, and you'll naturally cycle out of your insomnia." He suggests delaying bedtime by the equivalent amount of time insomnia is taking away. If it's taking you eight hours to get six hours of sleep, you're experiencing two hours of insomnia and should move your bedtime two hours later than usual to sync up your sleep opportunity and ability.

For 20 percent of people—as many as 40 million Americans, according to the Centers for Disease Control and Prevention—acute insomnia does become chronic, defined as three or more bad nights of sleep a week that goes on for three months or more. Perlis doesn't advise waiting that long to seek help, but to do so after two weeks of faithfully following the do-nothing approach. "Unfortunately, people often go to their primary care physician, who'll say, 'It'll pass,' and maybe prescribe a sleeping pill," he says. "There can be a time and a place for medication, but pairing it with no other therapy is a mistake."

Alternatively, 3.1 million adults each year turn to melatonin supplements, according to a survey by the National Center for Complementary and Integrative Health. But while the supplement can benefit people whose internal clock doesn't line up with their location, such as those experiencing jet lag, it's not a sleep aid. Melatonin is naturally released by the body when the sun goes down, setting off a series of events that ready you for sleep. If you take a supplement at 10 p.m., you're telling your body that the sun just went down—meaning sleep is still hours away. "And if you take it at inconsistent times, you get a really funky effect," Edlund says. "You're convincing your body that you're constantly moving time zones."

To treat chronic insomnia, the American College of Physicians recommends not melatonin but cognitive behavioral therapy for insomnia, or CBT-I, encompassing cognitive therapy and behavioral interventions like sleep restriction therapy and stimulus control.

6 People Like You When You're Rested

"We're intuitively aware that sleep deprivation increases fatigue and distress, but often we don't correctly attribute our emotional state to sleep," says Iowa State University psychologist Zlatan Krizan. "Instead, we blame others or our personal circumstances

SLEEP *continued on page 89*

PROP STYLIST: HEATHER GREENE/HELLO ARTISTS. STYLISTS: DANIEL EDLEY/BRYDGES MACKINNEY. VIVIENNE VAN DO. MAKEUP: YUMI KAZUKA. HAIR: KENTA KOUDA. SHOOT PRODUCER AND CASTING: CLAUDIA STEEZIUS. FASHION CREDITS: PG. 50: SILK PAJAMAS: SLEEPY JONES. PG. 53: COTTON PAJAMAS: SLEEPY JONES. PG54: T-SHIRT: ANN TAYLOR. PG. 57: COSABELLA BRALETTE.

SLEEP *continued from page 57*

for our negative emotions and reactions." Yet lack of sleep greatly affects emotions, and losing just a couple of hours makes one significantly angrier. For a 2018 study, Krizan had two groups do an innocuous task while being exposed to irritating background noise. Then half slept for seven hours while the rest slept two to four hours less. When they repeated the task the next day, complete with the irritating noises, those who had been sleep-restricted expressed far more anger and frustration than those who'd had enough sleep. "Sleep-deprived individuals simply have fewer resources to manage negative emotions, making them prone to increased reactivity," he explains.

"Loss of sleep also impairs regions of the brain that support understanding of another's intent," says Eti Ben-Simon, a postdoctoral researcher at the University of California, Berkeley. "It makes it harder to consider someone else's perspective, which is the basis for empathy." His 2018 research found that, in an exchange with a sleep-deprived individual, people tend to instinctively withdraw. "Interacting with a sleep-deprived person, even for just one minute, is more than enough time to recognize the other's loneliness—and immediately choose not to engage, which further spurs their social isolation."

Sleep restores activity in the prefrontal regions of the brain critical for emotion regulation. "During REM sleep, neurotransmitters involved in emotional responses, such as noradrenaline and dopamine, are completely absent," Ben-Simon says. "This helps to restore a neurochemical balance that supports emotional control the next day." Sufficient REM sleep is essential, then, to keep emotions in check, but it tends to suffer the most from early wake-up times, since the longest stage of REM occurs close to the morning. Ben-Simon advises waking up without an alarm to allow yourself to linger in REM.

7 Power Up a Nap

There may be no hotter sleep trend than the power nap, and companies like Ben & Jerry's, Google, and Zappos now allow employees to retreat to private spaces to rest on the job. Is corporate America finally making post-lunch napping a priority, as it has long been in areas of Spain, Italy, and China? Perhaps, but managers may have ulterior motives. "I think companies started looking at the research and learned that people are more productive, make fewer mistakes, think of more innovative ideas, and get more done when they're rested," Edlund says.

The ideal nap lasts 15 to 20 minutes and takes place after lunch but before 3 p.m., according to a 2017 study. The sleep should be short and light, so there's no sleep inertia—that groggy feeling we get when we're woken up after a long period of REM sleep. "Twenty minutes is powerful enough to restore attention and reaction time," says Damien Léger of the University Paris Descartes Hôpital Hôtel-Dieu Sleep Center, a co-author of the study. A separate study found that such brief naps almost immediately reduce sleepiness and improve cognitive performance, benefits sustained for up to three hours.

A proper nap also has stress-releasing and immune effects. "With sleep deprivation, and especially with chronic sleep deprivation, individuals experience increased levels of inflammation in the body," Léger explains. He has found that napping decreases levels of Interleukin-6, one marker of inflammation, an indication that napping helps the immune and neuroendocrine systems recover from sleep loss.

8 Reach for Your Dreams

Dreams have a function, but perhaps not the one you suspect. "They don't exist so you can try to interpret them to make yourself be a better person," says Rubin Naiman, a clinical professor at the University of Arizona Center for Integrative Medicine. Instead, it's believed that REM/dream sleep mediates memory consolidation and mood regulation. "It's like overnight therapy," Troxel says. "When you're deprived, you're more likely to focus on the negative, which can not only increase the risk for depression and anxiety but also eat away at your resilience."

But you can't experience these benefits without adequate sleep. "If you're sleep deprived, you're most likely dream deprived, too," Naiman says. When you don't give yourself time to cycle through the five phases of sleep—REM and the earlier, progressively deeper stages—REM is sacrificed first. "Those with apnea or insomnia likely have disrupted REM sleep," he says, "and using alcohol, cannabis, many antidepressants, or even some sleeping pills does the same." Alarm clocks also erode dreamtime. "They're dream killers," he says. "It's like turning the light on and shutting the projector off 10 minutes before the movie ends."

Perhaps the most common dream question is how to remember them, or whether one should even try. "It's hard to know if we need to remember our dreams," Naiman says, "but I think it's important because dreams help expand our minds and open our hearts. There's a profound suspension of judgment. You have a malleable sense of self, the fantastic is normal, and everything is meaningful. It's where creativity and empathy grow."

Over a lifetime, you may dream for five or six full years, and that's a lot of content to leave unexamined. But Naiman says it's not all that hard to set yourself up for better dream recall: "Before you go to sleep, simply tell yourself I want to remember my dreams. You'd be surprised how effective this plant is." When you wake up, linger in your grogginess, resume the last position you were sleeping in, and just do nothing for a time. "Your dream is a shy puppy," he says. "Let it come to you. If you chase it, it'll go away. ■

HOLLY PEVZNER *is a writer in New York City.*