ALL-NEW BEGINNER'S GUIDE

RUNNER'S WORLD

SHALANE FLANAGAN
"I want to win Boston so badly for everyone."

BOSTON MARATHON SPECIAL *OPEN FLAP*

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MASTER THE DOWNHILLS
POWER WORKOUTS p35

TAP INTO THE RUNNER'S HIGH

+ Sleep
The New Cross-Training
p98

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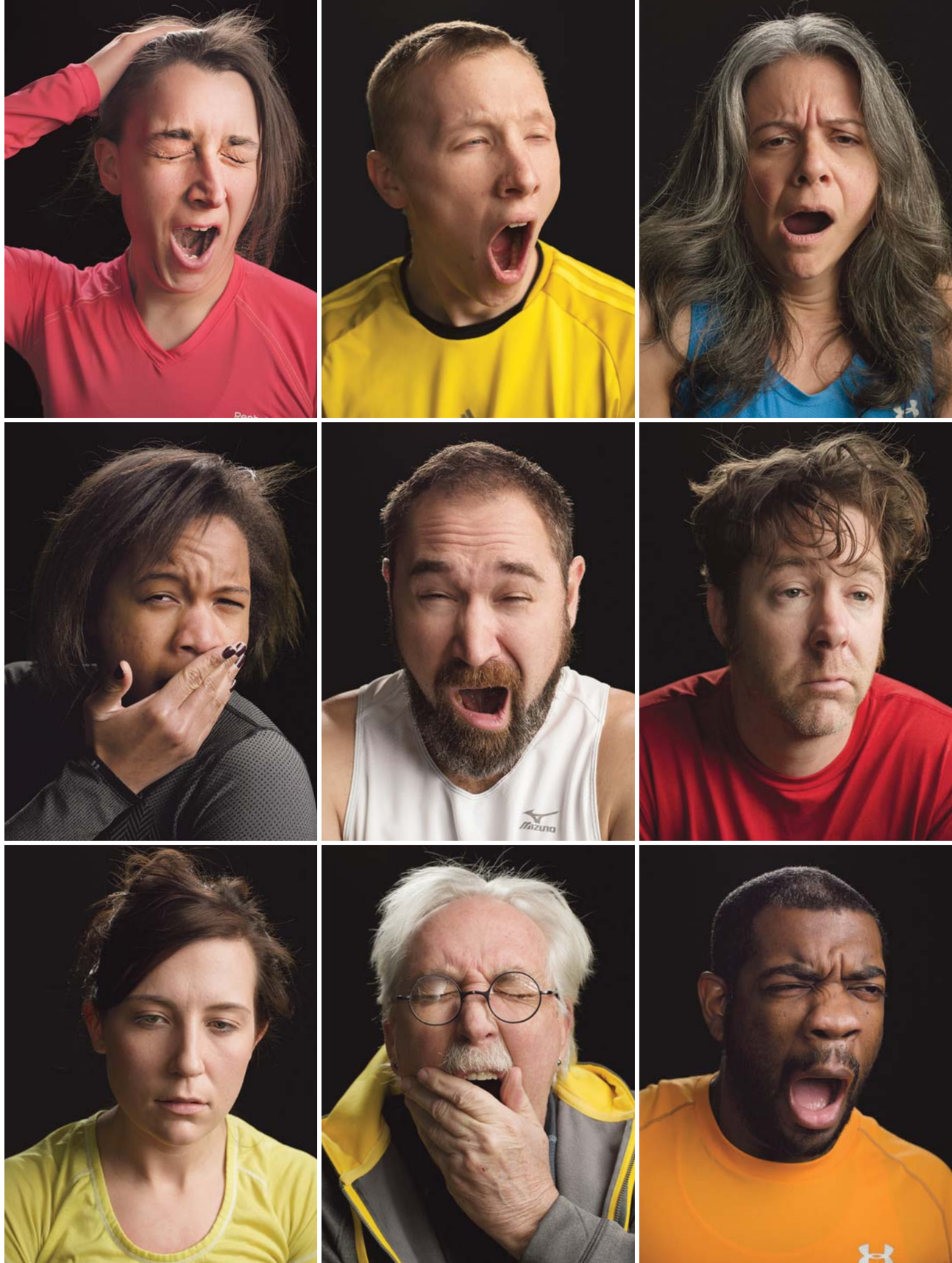
WORLD'S LEADING RUNNING MAGAZINE

GO TO SLEEP ALREADY!

Catching more Zzzzs can make you a stronger, better runner. Here's how to make it happen

BY **CINDY KUZMA** PHOTOGRAPHS BY **COLIN M. LENTON**

*(featuring sleepy members of the **Fishtown Beer Runners** club in Philadelphia)*



STATUS UPDATE

Late night last night. Still managed to get up at 4, knock out an 18-miler, and get the kids to school on time.

STATUS UPDATE

Didn't get enough sleep this week. Stayed in bed for an extra hour and skipped my run.

LET'S SAY THESE TWO status updates showed up on your Facebook or dailymile feed. Which would get more "likes"? If you're like many runners (and most Americans), you probably admire the badass who fought through fatigue to complete her run and suspect that the slumbering beauty is a slacker.

Our society views sleep as a luxury, at best. Many people think that revealing your need for it marks you as a weakling, says John Caldwell, Ph.D., a psychologist who has researched sleep deprivation and fatigue for NASA and the U.S. military. "We think if you're really a good athlete, that means you're tough and you'll take whatever life throws your way," Caldwell says. "Part of being tough is not needing to sleep."

By that line of reasoning, some of the country's top marathoners rank as total slouches. After all, Ryan Hall pens naps in his calendar as "business meetings," and both Deena Kastor and Shalane Flanagan log as much as 10 hours of shut-eye a night. (See "Sleep Like a Pro," page TK). They clearly understand what science is increasingly revealing: It's during sleep that your body recovers from hard training and builds you into a better runner.

Indeed, recent research suggests just one night of bad rest can have an impact (albeit largely psychological) on your running performance. Meanwhile, chronically shorting yourself of even an hour of sleep per night has cumulative negative effects on your running and your health. "Sleep is as important as your workouts," says Joe English, a running coach in Portland, Oregon, who works with the Leukemia and Lymphoma Society's Team in Training program. "When you start robbing from that pot to get everything else done, the quality of your training—and of everything else—starts to fall apart."

SLEEP MUCH?

No lab test can tell you exactly how many hours of sleep you need—the number varies widely by individual. But the average adult needs between seven and nine hours each night, says Matthew Edlund, M.D., director of the Center for Circadian Medicine in Sarasota, Florida, and author of *The Power of Rest*. Not surprisingly, how much you run impacts how much you need to sleep, but it's not a simple more-means-more equation. Research has linked moderate exercise to higher-quality, more efficient slumber— possibly by increasing levels of a compound called adenosine that promotes sleep. And so, **people logging moderate mileage might actually need less sleep than those who don't run at all.** But as anyone who's ever trained for a half-marathon or longer can attest, sleep needs can change at the start of a new running program or in the midst of a tough training cycle, says

NAP TIME?

You didn't sleep well last night. You have a hard workout planned for later today. Is a siesta a good idea?

YES If you can limit your snoozing time to less than 30 minutes. A short nap can give you a cognitive boost, making you feel alert, refreshed, and motivated—but not groggy. And that can translate to a better workout. You don't even need to fall asleep; research shows that just resting quietly for a few minutes can be restorative.

NO If you're having regular problems sleeping at night. Napping can make it more difficult to drift off at night—and it's no substitute for a complete night of rest (you need to rest long enough to go through all four stages in order to get the full physical benefit; see "Your Brain on Z's," page TK). Also, longer naps don't necessarily offer the same mental boost as a quick snooze. If you sleep longer than 30 minutes, it's likely you'll wake up feeling groggier and in worse shape than you did before you snoozed.

Runners on previous page (left to right): Felicia Peretti, Hunter Proctor, Trish Houck, Kenya Brown, Bobb Hawkey, Brendan Swire, Rachel Kraushaar, Pat Carroll, Jesse Dogan

Runner: Raelynn Zapulla; Illustrations by ZOHAR LAZAR

Cheri Mah, M.S., a Stanford University sleep researcher. There's not yet a handy chart for correlating weekly mileage to required hours of sleep. Your body will likely supply some cues when you don't get enough. You're likely short on Z's if you fall asleep the second your head hits the pillow, you find yourself dozing off during meetings or at the movies, you rely on caffeine to get through the day, or you hit the snooze button more than once. "If your body is literally going back to sleep immediately after being asleep all night long, you are probably not getting enough sleep," says Robert Oexman, D.C., a runner and the director of the Sleep to Live Institute in Mebane, North Carolina.

Ignore these signals at your peril. "When you don't obtain your required amount of sleep, it can build up like a debt, almost like a credit card," Mah says. Most of us have racked up some—the most recent national survey shows **about 40 percent of Americans sleep six hours or less each night.** "Over time," Mah says, "that accumulated debt can affect performance and mood."

WHILE YOU ARE DREAMING

Night after night of restricted (or interrupted) sleep—where you rest some, but not enough—sets off a cascade of hormonal shifts with harmful biological effects. Within a week or two, you'll have higher levels of the inflammatory marker C-reactive protein and the stress hormone cortisol, keeping your heart rate higher and your nervous system on constant alert.

Human growth hormone, which repairs muscle and bones, is secreted by your pituitary gland during deep sleep, says Shelby Harris, Psy.D., director of the Behavioral Sleep Medicine Program at Montefiore Medical Center. The less sleep you get, the lower your levels—and the slower your recovery from workouts or minor aches and pains. Your muscles' ability to store glycogen for energy declines, meaning you risk running out of gas no matter how much you carb-load, says Harris, who is also a runner. There is also some research that indicates your risk for injury goes up if you don't get enough shut-eye.

Sleep also serves as a time for memory consolidation, Dr. Edlund explains—and not just for cognitive skills, like math or Spanish. "Running is a very big learning experience," he says. As you train, your brain takes in information about the world around you, the way muscles and nerves must work together to power each stride, and the way your body position shifts in space (proprioception), he explains. It's during sleep that you process, synthesize, and catalog these details, and skimping means the memory-related areas of your brain don't file away as much as they should.

Being sleep-deprived doesn't just make you tired, but also jittery, achy, and injury-prone. There's no magic number of hours that protects you from poor performance or from running-related pains—again, everyone's sleep needs differ, Dr. Edlund says. But the more nights you get less than your required amount, the greater the potential consequences to your running.

And in the bigger picture, you're probably harming your overall health, too. Sleep deprivation throws your hunger hormones out of whack, increasing levels of the hunger-inducing ghrelin and decreasing satiating leptin, Harris says, which in turn may cause you to eat more and gain weight. In addition, not getting ample sleep suppresses the immune system (leaving you susceptible to infection); your mood can sink down into the dumps; and your risk for developing chronic diseases, such as type 2 diabetes, rises.

TOSS AND TURN, CRASH AND BURN?

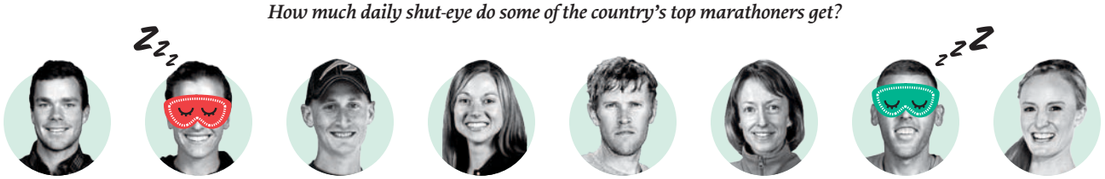
Runners know insomnia is common the night before a big race. But they take comfort from this often dispensed piece of wisdom: "It's not your sleep the night before a race—it's the night before the night before that counts." Anecdotal evidence bears this out. No one sleeps much the night before an Olympic race, says Paula Schnurr, who ran the 1500 meters for Canada in the 1996 Summer Games. Few first-time marathoners rest well either, English says. But many perform well anyway, fueled by race-day excitement and adrenaline.

Research supports this hypothesis, to a degree. When scientists keep people up all night and then ask them to cycle, lift weights, or run on a treadmill, they can do it just as well as when they've slept. But interestingly, they report that each mile or rep feels harder and they often don't want to put forth the effort. **"In order to run a good race, you have to be in a state of mind where you're going to push it,"** Caldwell says. "We've known for years that sleep deprivation typically doesn't really affect absolute things like muscle contractions, speed, and power. But it definitely affects your willingness to perform your best." When you head out for a training run sleep-deprived and with no cheering crowds or competition, these deficits could lead you to slack. As a result, you might not give your body a strong enough stimulus to adapt and improve your running, English says. What's more, lack of sleep impairs congitive function and reaction times, which could put you at risk of a collision if you're crossing busy streets or running on a crowded path or rocky trail, says board certified neurologist Lev Grinman, M.D., the medical director at HomeSleep, LLC in Paramus, New Jersey.

In fact, if you've slept fewer than about six hours, you might benefit more from staying in bed an hour longer than from forcing yourself to stumble out on a run, says Shawn Youngstedt, Ph.D., an exercise physiology researcher at the University of South Carolina, who is also a runner. Even top coaches and athletes sometimes follow this guidance. Schnurr—now the head track coach at McMaster University in Ontario—says she can tell when her student athletes show up to practice without having slept well. She often modifies their workouts or sends them home from practice entirely, knowing they wouldn't reap the benefits of a tough training session while sleep-deprived.

SLEEP LIKE A PRO

How much daily shut-eye do some of the country's top marathoners get?



BOBBY CURTIS
2:13:24 PR
Zero to 4 hours one or two nights per month; otherwise, 7 to 8 hours. "If I sleep poorly, I remind myself that it's just one night."

AMY HASTINGS
2:27:03 PR
8 to 11 hours of sleep. "Without quality sleep, not only would I not be able to do each workout to the best of my ability, but I'd get hurt more often."

TYLER MCCANDLESS
2:17:09 PR
7 to 8 hours per night. "I go to bed every night at 9 p.m. and wake up without an alarm. I won't book flights that impact my sleep schedule."

TERA MOODY
2:30:53 PR
About 5.5 to 7 hours per night. "I never need to set an alarm. I generally don't ever sleep past 3:30 or 4 a.m."

RYAN HALL
2:04:58 PR
8 to 9 hours per night, plus a 60- to 90-minute nap. "Sleep is when my body grows stronger. I protect my sleep like a pot of gold."

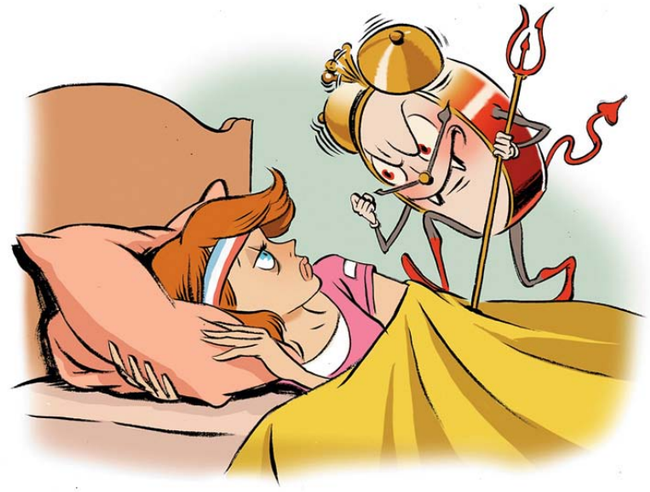
DEENA KASTOR
2:19:36 PR
10 hours. "A hard work ethic needs to be balanced with a disciplined sleep ethic. Many athletes think they are overtrained, when they are under-rested."

JASON HARTMANN
2:11:06 PR
7 to 9 hours, plus a 20-minute to two-hour nap. "I can feel the difference in my workouts and see it in my times if I get less than 8 hours of sleep."

SHALANE FLANAGAN
2:25:38 PR
8 to 10 hours, plus a one- to two-hour nap. "Marathon training is exhausting, so I usually require the most sleep and nap every day."

Photographs by Victor Sailer/PhotoRun (Curtis, Hastings, Moody, Hartmann); MCT via Getty Images (Kastor)

IT'S 2:50 A.M. GET READY TO RACE!



EARLY START

As race directors cope with increasing numbers of runners—requiring courses to be closed for longer stretches—events sometimes start well before sunrise. The Walt Disney World Marathon and Half-Marathon, for example, begin at 5:30 a.m., and runners must begin the journey to the starting line hours earlier. Similarly, the Honolulu Marathon kicks off at 5 a.m., with runners boarding buses beginning at 2 a.m. Factor in time to get dressed and eat breakfast, and some runners may have to set their alarms somewhere close to their regular bedtimes. Here's how to cope.

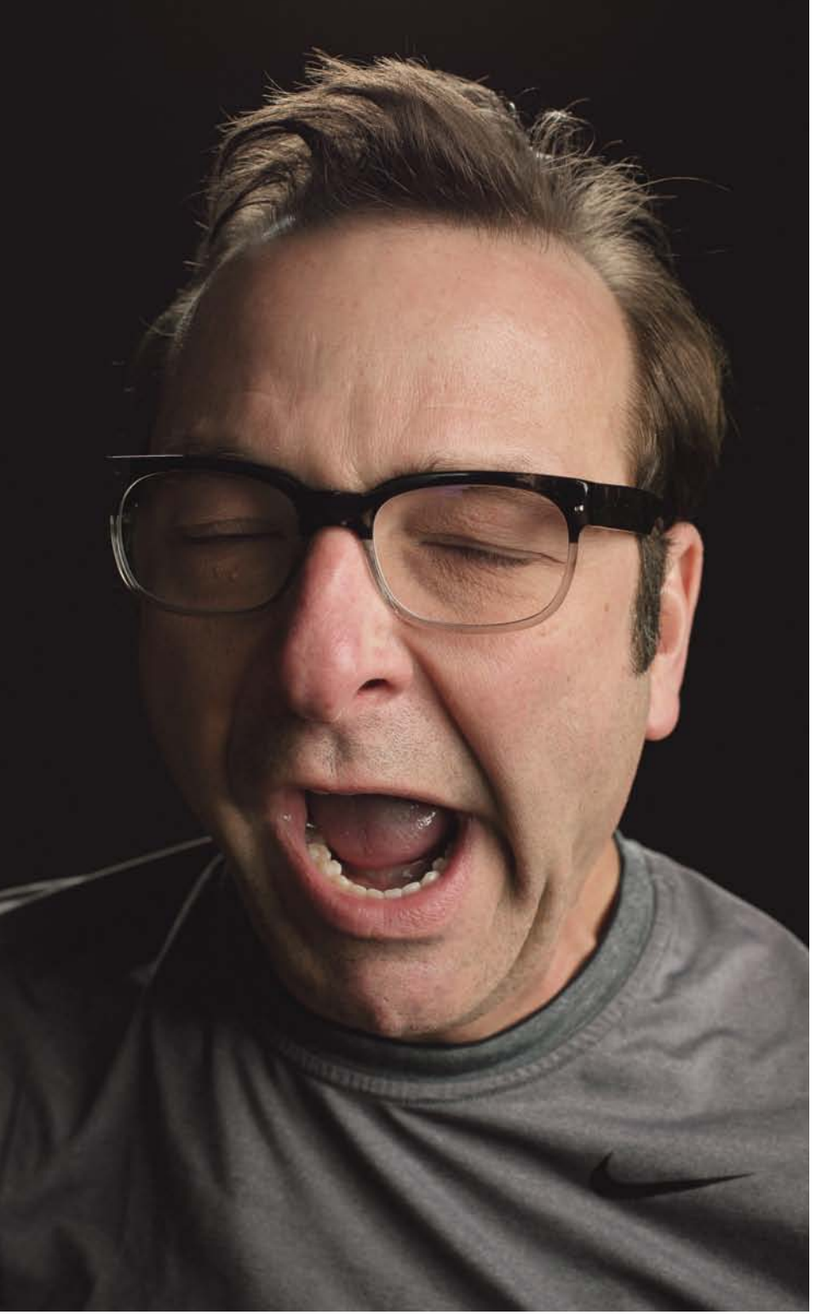
SHIFT YOUR SCHEDULE. Calculate the number of hours earlier you'd like to go to bed before your race. Then divide that number by seven. If your bedtime is usually 11 p.m. and you want to be able to fall asleep on race eve at 8 p.m., take the three-hour difference (180 minutes) and divide that by seven. Starting a week before the race, shift your sleep/wake schedule by that amount (in this case, 25 minutes), gradually increasing it (25 minutes per day) so that, by race eve, you're at your goal bedtime. "People who extend their sleep period prior to a sleep restriction are more resilient to the sleep restriction, and they also recover more quickly," says sleep expert John Caldwell, Ph.D.

TRY A SLEEP AID. If you've traveled across time zones, it may be extra challenging to get your body's rhythms in sync with local time. Taking a milligram of melatonin 30 minutes to an hour before you go to bed can help you adjust to your new bedtime, says sleep expert Robert Oexman, D.C. (Practice this during training, of course; never take a new supplement just before a race.)

CARB-LOAD WITH PASTA, NOT HOPS. Cutting back or eliminating alcohol and caffeine for at least two nights before a race will encourage easier and more restful slumber, says sleep expert Shelby Harris, Psy.D.

PERK UP. If you do toss and turn, it's safe to use caffeine on race morning—if you trained with it and can tolerate it. Not only will it pep you up, research suggests that it also improves performance.

DON'T SWEAT IT. Keep in mind that one restless night probably won't wreck your race. "We know that when people worry about their sleep, that exacerbates things," says Shawn Youngstedt, Ph.D., an exercise physiology researcher. "If runners fret that poor sleep is going to impact their performance, it becomes more of an issue."



Runner: David April

Many people can bounce back quickly from one or two nights of poor rest. But performing well gets harder the longer you're deprived. "I've had some really good races after I didn't sleep for one night, but I've never had a good block of training while sleeping poorly for a few months," says Hansons Brooks athlete and former NCAA 5-K champion Bobby Curtis, who has suffered from bouts of insomnia.

AVOID AN ENERGY CRISIS

When Mah asked Stanford basketball players to sleep up to 10 hours a night for five to seven weeks, they performed better on the court. She found similar results in swimmers, too. Now, spending almost half the day in bed isn't a luxury most of us can afford—and it may not even be necessary. Your body's optimal amount could be seven hours; it could be eight. Harris recommends determining your ideal sleep pattern when you have a weeklong vacation or other situation that doesn't require a strict schedule: Don't use an alarm clock, wake up naturally, and take note of what time you went to sleep and got up. By the fourth day, you'll have caught up on sleep debt; take the average amount of sleep you get on nights four through seven for a good estimate of your true needs, she says. Once you've figured out about how much sleep your body naturally wants, schedule your bedtime in advance, just like you would any other commitment, Caldwell advises.

Mah says that runners can still benefit from "sleep-loading"—getting extra shuteye in the week or two before beginning a training program that ramps up your mileage. **Committing to just a half hour more each night to pay off your sleep debt in between training cycles enables you to kick off a new program refreshed and strong.** "That's a half hour less texting or checking your e-mail, or DVR-ing your favorite late-night show and watching it another time," Mah says. And, of course, there's the chance that you'll feel so good during this period of time that you might decide to make an earlier bedtime permanent.

Experts also recommend tracking your sleep—just like you log your miles—in order to help you correlate your rest to your running performance (see "Sleep Aids," below). While that won't give you more hours in the day, it may help you place sleep and training on equal footing. "If you're obsessed with logging your 40 miles, try to be as obsessed with logging your X hours of sleep a week," English says. "When you do, it's going to really positively impact the quality of your workouts."

Keeping track can also help you recognize if something goes awry

BEST REST

Spending eight hours in bed won't help if you're tossing and turning the whole time. Fall—and stay—asleep with these expert tips.

BE CONSISTENT Stick to the same sleep-wake schedule—even on weekends. And create a relaxing presleep ritual, like doing light yoga, listening to calming music, or reading your favorite running magazine. Adopting a bedtime routine will prompt your body to fall asleep more easily, says Stanford sleep researcher Cheri Mah, M.S.

HIBERNATE "Make your room like a cave—dark, quiet, and cool," Mah says. Invest in blackout curtains and a white-noise machine or fan, and block glowing lights from alarm clocks or phones.

POWER DOWN Turn off TVs, laptops, and tablets an hour before bedtime—their blue light blocks the production of the sleep hormone melatonin, says Shelby Harris, Psy.D., director of Montefiore's Behavioral Sleep Medicine Program in New York City.

DRINK LESS To avoid middle-of-the-night bathroom breaks, cut back on water consumption three hours before bedtime, Harris says. Beer or wine may help you conk out more quickly, but alcohol disrupts the later, deeper stages of sleep.

CUT OFF CAFFEINE Caffeine can linger in your system for more than six hours. For best results, switch to decaf (or at least green tea, which contains only about 50 milligrams of caffeine) after 5 p.m., says researcher Christopher Drake, Ph.D., of Henry Ford Hospital Sleep Disorders and Research Center in Detroit.

SNACK If your stomach's grumbling before bed, eat a small snack with protein and carbs. This prevents hunger from waking you and also provides your body with raw materials to make more melatonin (a compound that promotes sleep), says Robert Oexman, D.C., director of the Sleep to Live Institute in Mebane, North Carolina.

EASE PAIN NATURALLY Nonsteroidal anti-inflammatories like ibuprofen keep some people up at night. Avoid taking before bed, or try a supplement like fish oil or glucosamine/chondroitin instead, says Dr. Oexman.

HAVE PATIENCE If you have true insomnia—difficultly falling or staying asleep—maintaining a consistent running routine can improve your symptoms, but not necessarily immediately. Exercise can take up to four months to improve sleep, according to a recent study in the *Journal of Clinical Sleep Medicine.*

CAFFEINE CAN GIVE YOU A PERFORMANCE BOOST. BUT IT'S NO SUBSTITUTE FOR ACTUAL SLEEP.

SLEEP AIDS

Products that work to help you sleep

BERRY SLEEPY
$49.95 (save $10 using the promo code "run")
Created by marathon runners, these pills are a berry blend containing tart cherry, which contains natural melatonin. Research also suggests cherry decreases inflammation.
berrysleepy.com

PILLO1
$199
Designed by a chiropractor who treats athletes, this pillow aims to align your spine at night (whether you are a back, side, or stomach sleeper) to improve your sleep quality and help you avoid aches in the morning.
pillo1.com

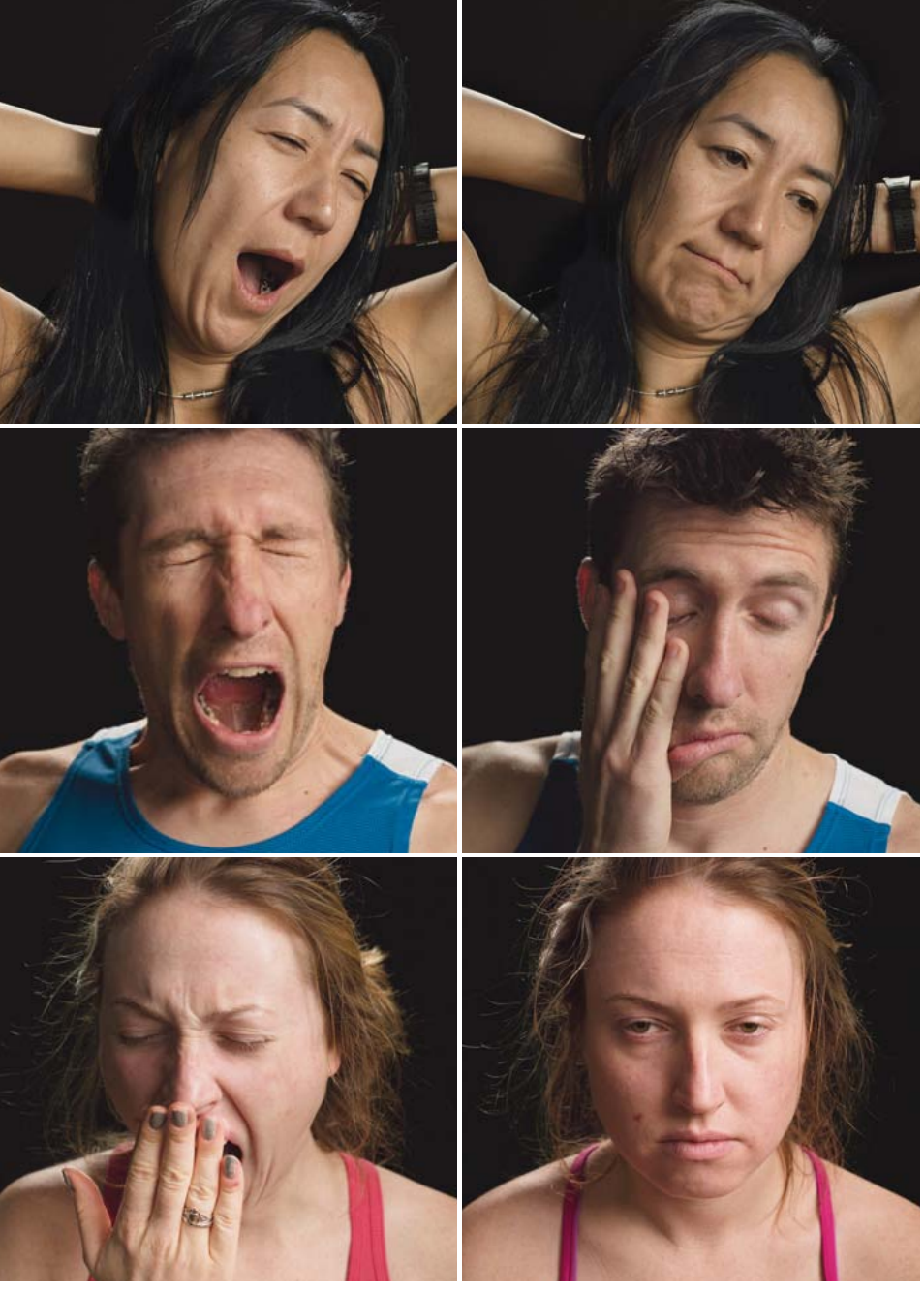
FITOVER EYEWEAR
$79.95
Just can't put down the iPad at night? Slip these frames on to prevent its glow from suppressing melatonin production. The company also sells filters that reduce your exposure to blue light at night.
lowbluelights.com

NIKE+ FUELBAND SE; FITBIT ONE
$99.95–149.99
These devices track the intensity of your workouts, then monitor how long and how well you sleep at night. They come with apps and online dashboards to show you your snoozing stats.
nike.com, fitbit.com

SLEEP TIME APP
$1.99
If you don't want to shell out for a separate device, download this app, which uses the accelerometer in your phone to detect when you're asleep. The alarm wakes you at the right point in your cycle to avoid grogginess.
azumio.com

WITHING SAURA
$299
This "smart sleep system" monitors room temperature and noise pollution plus your heart rate, breathing rate, and sleep cycles. It also functions as a sound machine and releases a special light that promotes melatonin production.
withings.com

SHEEX PERFORMANCE SHEETS AND SLEEPWEAR
$24–249
Outfit your bed and body with the same types of fabrics you run in to stay cool and dry while you sleep. They're smooth, soft, and basically wrinkle-free.
sheex.com



YOUR BRAIN ON Z'S

In a full night's rest, you'll go through four stages of sleep, which make up a full sleep cycle that lasts 90 to 110 minutes. Adults usually go through four to six cycles of these stages each night. N3 and REM sleep play the biggest role in helping your body recover and repair itself, says Lev Grinman, M.D., of the American Academy of Sleep Medicine. It's ideal to get through your first full cycle of all four stages uninterrupted—a reason you shouldn't drift off on the couch and then move to bed midcycle. And why parents with restless little ones might have an extra challenge feeling recovered from workouts.

N1 Very light sleep (about 5 percent of your night): This occurs when you first fall asleep and again after each interruption. Your brain waves shift, your muscles relax.

N2 Light sleep (about 50 percent of your night): Breathing and heart rate relax. It's more difficult to wake you up.

N3 Deep sleep (about 20 percent of your night): The most restorative rest, this stage lasts for 20 to 40 minutes during the first cycle but decreases in length as the night wears on. Your body secretes human growth hormone, and it's difficult or nearly impossible to wake up.

REM Rapid eye movement sleep (about 25 percent of your night): Your eyes, face, arms, and legs twitch, and your brain waves speed up again. Most dreams occur during this stage, and your muscles are paralyzed so you can't act them out.

in your training. In a recent study in the journal *Medicine & Science in Sports & Exercise*, athletes who overreached—or who ran more miles, or did more intense workouts, than their bodies could handle—showed disrupted sleep patterns, possibly because of an over-active autonomic nervous system (the part that controls your heart and other internal organs. If you're unable to sleep well, it could mean you need to cut back or incorporate more rest days to absorb all the hard work you're doing, says study author Yann LeMeur, Ph.D., of the National Institute for Sport, Expertise, and Performance in Paris.

Finally, **monitoring your sleep habits often gives you a bigger-picture view of whether your goals mesh with your life at the moment**, Harris says. If you just had a baby and you're also in grad school, for instance, now may not be the time to train for your first half-marathon. "You really have to be realistic—maybe you just can't get up at 5 in the morning to run if you can't go to bed until midnight," Harris says. You don't have to stop running—remember, runners tend to sleep better—just consider whether you should scale back expectations, or run for stress relief rather than trying to stick to an aggressive plan. On the flip side, if you have an ambitious goal—say, setting a new PR or qualifying for Boston—plan it for a time when you can rearrange your life to accommodate the training and recovery necessary.

If you happened to be Facebook friends with Hall, he'd probably tell you the same thing (and he wouldn't like a post about skipping shut-eye). "I rarely stay out past 9 p.m. when I am in hard training, and I always protect my 'business meetings' by not scheduling any phone calls or appearances in the afternoon," he says. "It is the most crucial part of my training. If I cannot recover from my training, then there is no point training." RW

Runners: (top) Yoshiko Jo, (center) Matt Stanley, (bottom) Britt Miller