



**The United States is sleepwalking
through life, putting our collective
health, safety, productivity, and even our
nation's world standing at risk.**

By Lisa Van Gemert

What if we could undo some of the worst disasters of our time? Those events so horrific they have entered our collective memory—*Exxon Valdez*, Chernobyl, the space shuttle *Challenger*, Three Mile Island. Let's throw in the recent Metro-North train wreck and at least 100,000 automobile accidents every year for good measure. Now imagine we could erase these catastrophes for free with a treatment people universally enjoy. Just add sleep. While massive disasters have complicated causes, a common thread weaves through all of these tragedies—a lack of sleep.

We are a nation performing a vast, unsupervised sleep-deprivation experiment, and the results are devastating on both national and personal levels. Many of us are functioning with chronic sleep deficits at the same time that science is accumulating a persuasive body of research that demonstrates the vital role sleep plays in virtually every aspect of human endeavor.

Jeffrey Ellenbogen, a professor of neurology at

Johns Hopkins, argues against our most fundamental view of what sleep is. "Rather than being a passive state," he says, "it's a dynamic neurobiological process." It turns out that while you are asleep and perhaps feeling at your least productive, your brain is carrying out essential tasks that if disrupted affect nearly every waking moment.

While you sleep, your brain is cleaning up from the neurological party that is everyday life. Memories, both cognitive and emotional, get discarded or coded for long-term memory storage. Rebecca Spencer, associate professor at the University of Massachusetts, Amherst, and the principal investigator of its Cognition and Action Lab, explains one role of sleep is to help us process memories for future use. "This allows us to make better decisions when we come back the next day," she says. "We're less shaken up and see with a clearer view. During sleep, memory consolidates, moving from the temporary storage in the hippocampus to long-term storage in the outer cortex. Sleep helps us remember."

SLEEP FACTS

Nearly half of everyone snores.

Men are more likely to fall asleep while driving than women.

Roughly 50 percent of us sleep exclusively on our sides. Just 17 percent of us sleep on our backs.

The fear of sleep is called somniphobia.

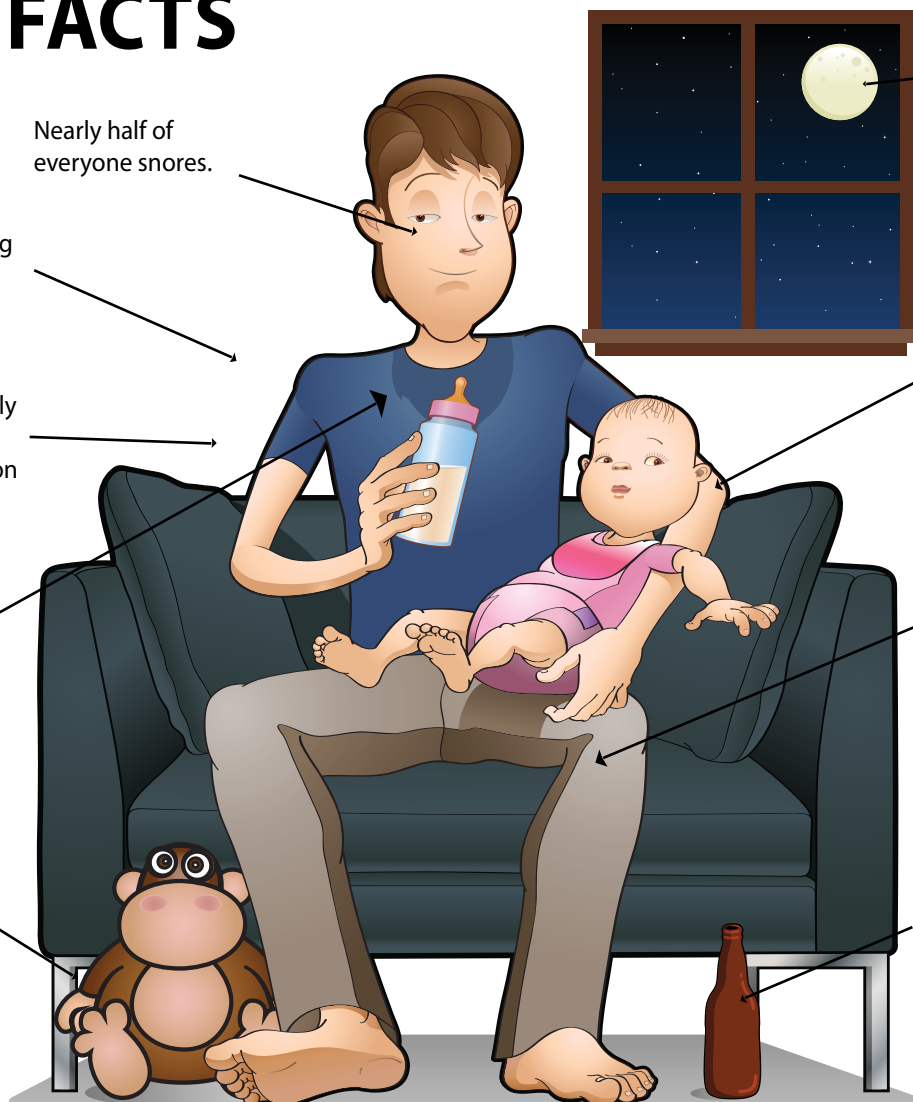
Humans as a whole sleep less than other primates.

Humans dream more than two hours a night.

New parents lose between 400 to 750 hours of sleep during the first year.

No one knows why, but, as one study showed, bright light on the back of your knees can reset your circadian rhythm.

Going 17 hours without sleep is the neuro-equivalent in cognitive impairment of a blood alcohol level of .05 percent.



During sleep, brain toxins get cleared away, increasing the space between brain cells. “Sleep gives us a clean slate in the hippocampus for taking in new information,” Dr. Spencer says. So a lack of sleep is a double whammy with regard to memory: You may lose what you should have had, and you don’t have room for the new stuff you need to take in.

Sleep is governed by two complementary systems—the circadian system that drives wakefulness, and the homeostatic sleep system that drives the need for sleep. The circadian system is governed by a clock-like sleepmaker (your biological clock), in the anterior hypothalamus. External time clues from the environment called zeitgebers (literally “time givers”) synchronize this pacemaker with your day. Some common zeitgebers include light/dark, temperature, and even meals.

The homeostatic sleep system drives you closer and closer to sleep, as levels of the sleep-promoting neurotransmitter adenosine rise with every waking hour (caffeine keeps you awake by blocking the actions of adenosine). Like most body systems, the need for sleep

and wakefulness are in a constant ying-yang balletic battle for balance. It’s a war sleep is losing.

We sleep in cycles that last between 90 and 110 minutes, moving through five stages of sleep, including the well-known REM sleep. It’s recommended by many that adults get seven to nine hours of sleep to function optimally, and most adults don’t get that. Research done by the National Sleep Foundation reveals that about a quarter of adults self-report getting less sleep than they need, with 50 to 70 million adults suffering from a sleep or wakefulness disorder, often struggling to make up sleep deficits with marathon sleep events on weekends. If it takes you fewer than five minutes to fall asleep, experts say you’re too tired. Many of us are. In one survey, nearly 40 percents of respondents reported unintentionally falling asleep during the day at least once in the previous month.

In addition to self-inflicted encroachments on sleep time, many other factors have a depressive effect on the amount of sleep we get. The culprits will not surprise you: caffeine, alcohol (a depressant, yes, but one with a

5 STAGES OF SLEEP

STAGE 1

Light sleep:

Drifting into sleep, muscle activity slows, person easily wakes, hypnic jerk occurs most often.

STAGE 2

Deeper sleep:

Moving more into sleeping state, brainwaves slow, breathing and heartbeat become regular.

STAGE 3

Deep sleep:

Slowest brainwaves and breathing occur; body restores tissues, muscles, and energy stores.

STAGE 4

Deep sleep (cont.):

Muscles relax; growth hormones are released; bed wetting, sleep walking, and night terrors can occur.

STAGE 5

REM sleep:

Brainwaves most resemble those when awake; eyes move quickly, dreams occur, body is completely immobile; provides energy and improves daily performance.

Sources: *The Sleep Foundation*, webmd.com.



pesky “acute rebound insomnia” habit), nicotine, long-acting stimulants used to treat ADHD, medications taken for depression, too-early start times for school, teens working part-time jobs, and over-the-counter meds containing stimulants (like pseudoephedrine) or sedatives (like diphenhydramine) all interrupt sleep.

Aldous Huxley once said, “That we are not much sicker and much madder than we are is due exclusively to that most blessed and blessing of all natural graces, sleep.” As a society we are getting sicker and madder because we are bereft of enough of that natural grace. If you seek medical attention for a sleep problem, your doctor will have more than 70 sleep disorders from which to choose. The Centers for Disease Control has called our nation’s tendency to not get enough sleep a “public health epidemic.”

We’re getting madder because we need sleep to behave well. Research conducted by Seung-Schik Yoo, associate professor at Harvard Medical School, shows that when you are overly tired, your amygdala flares when it otherwise would have been calm, leading to increased emotional response to even neutral stimuli. “It seems that a night of sleep may ‘reset’ the correct brain reactivity to next-day emotional challenges,” he says.

If a panacea is a cure all, a lack of sleep is a *panmalady*—something that causes widespread, inescapable harm to all it touches. Sleep deprivation or even restriction is a contributing factor in high blood pressure (even in kids), obesity, bad behavior, increased drug use, increased stroke and cancer risk, as well as the more pedestrian and obvious effects such as drowsiness and fatigue. It makes our bodies less able to grab sugar out of the blood stream and can even make us more likely to engage in bullying behaviors. We focus on the dangers of texting and driving as well as drinking and driving, but drowsy driving, while sounding kind of cute, is far more deadly. It all sounds too bad to be true.

Leaving the physical health effects aside, concentrate on the cognitive effects of a lack of sleep. A report in the official journal of the American Academy of Pediatrics on excessive sleepiness asserts, “High levels of sleepiness impair complex performance, leading to lapses in attention, slowing of motor and cognitive reactions, mental mistakes, working-memory

HELPING KIDS GET TO SLEEP

Follow these tips from sleep expert Dr. Rebecca Spencer, mom of two, if your child can’t fall asleep.

- If the child can’t fall asleep within half an hour, she should get back up again so bedtime doesn’t become associated with worry. During that time, follow the next two suggestions.
- Don’t use computers, TVs, or other light-emitting devices, as these will trigger the mind to wake up.
- Avoid stimulating activities like gaming (and even for our avid readers, books) in favor of calm activities like writing or guided relaxations. Prayer or meditation can be very calming.
- If your child has difficulty falling asleep, head-to-toe imagery works reasonably well, imagining each area of the body becoming more and more relaxed.
- In her lab, researchers are able to get even non-napping preschoolers to nap with verbal encouragement (“We’re doing this today”), by sitting near the child, by laying a hand on the child’s back, or by foot rubbing.



errors, [and] time-on-task decrements.” In other words, not getting enough sleep makes you tired *and* stupid. In one Israeli study, just an hour difference in sleep among upper elementary students resulted in a huge performance impact. “A loss of one hour of sleep is equivalent to [the loss of] two years of cognitive maturation and development,” says Avid Sadeh, the Tel Aviv University researcher who conducted the study.

It’s not just a lack of concentration and difficulty paying attention that are problems. Our visual memories suffer too, with college students in one study performing 40 percent worse at recalling images when they hadn’t had enough sleep. And many researchers believe these

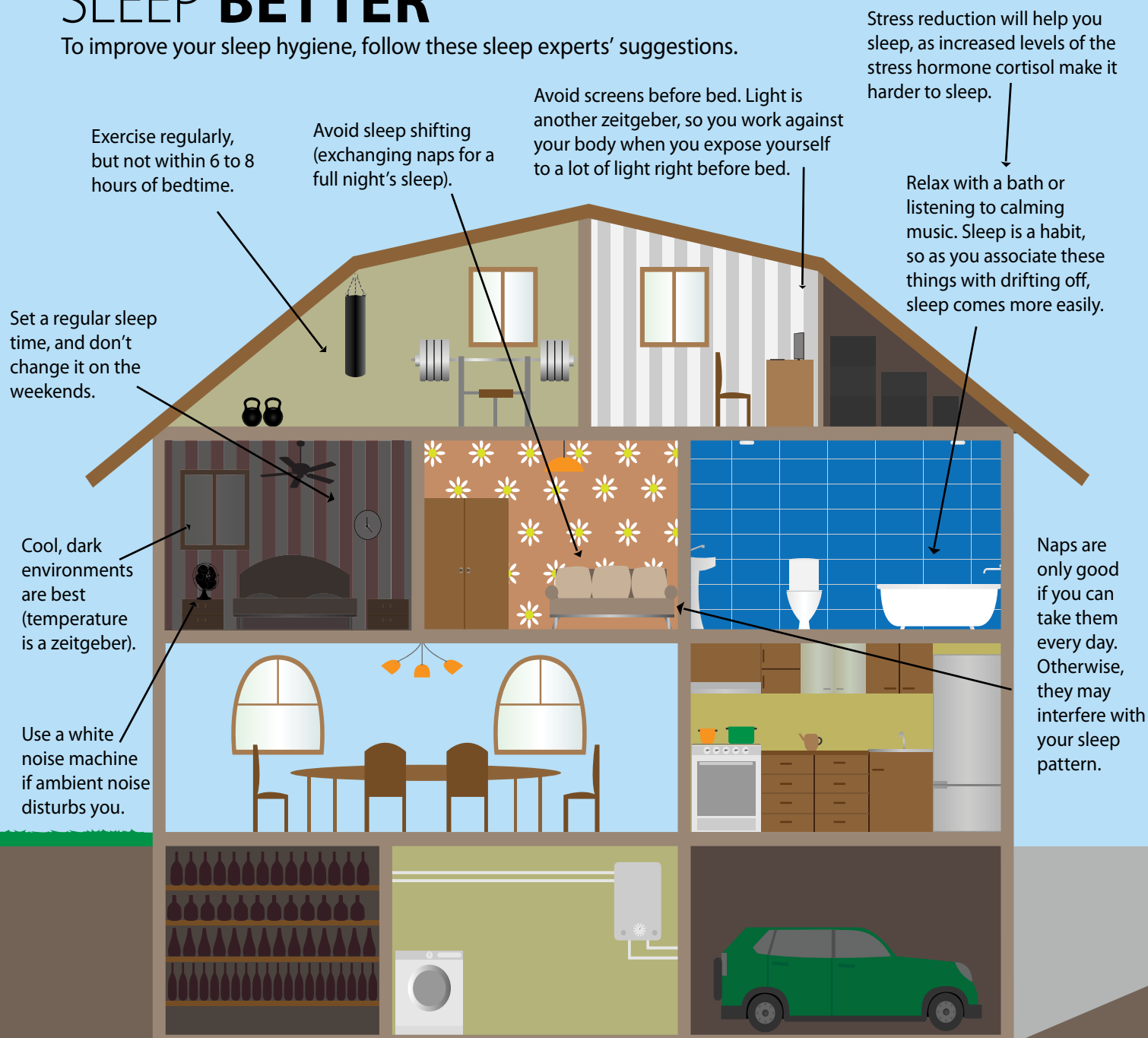
effects can be longer lasting than those of us tossing and turning would like to believe.

Some researchers believe a prolonged lack of sleep may change the physical structure of the brain, and not in a good way. Those studies that showed sleep deprivation may aid in treatment of depression? If you ever read *Flowers for Algernon*, you’ll know how that turned out. As soon as you got enough sleep, the benefit disappeared, and in its place you were left with a brain that was altered for the long haul, according to Yoo, who, along with a group of colleagues, has been studying sleep deprivation’s effect on the brain.

That feeling of euphoria you get when you haven’t

SLEEP BETTER

To improve your sleep hygiene, follow these sleep experts’ suggestions.



had enough sleep one night? “It’s short-lived,” Yoo says. And it’s not worth it, according to Dr. Spencer. “Even mild sleep restriction causes deficits. It doesn’t take a lot to throw you off.”

Ironically, Dr. Spencer says temporary insomnia may have a neuroprotective effect. When we experience emotional trauma, insomnia prevents us from consolidating those painful memories. So it may actually undermine your ability to emotionally manage grief if you try to circumvent your body’s attempt to protect you from permanent emotional memory by taking sleep medications when you are in acute distress. Many sleep medications work by binding to the receptors responsible for thinking, so they can affect cognition as well as sleep. They’re not physically addictive, but because sleep is so habit-driven, we quickly become psychologically dependent upon them.

One segment of our population at great risk for sleep disturbance is the group of pre-young adults (ages 13 to around 20). Their natural circadian rhythms want them to go to bed around midnight, but their schools start around 7:30 a.m. Adolescents are what sleep experts call “owls” (as opposed to “larks,” those of us who naturally rise with the birds). If teens were adults, we’d diagnose them with Delayed Sleep Phase Syndrome and consider treating them with melatonin or light therapy (with mixed results),

explains Dr. Spencer, who describes them as suffering from “social jet lag.” The pervasiveness of the problem means that they don’t get identified as having a sleep problem. Apparently, it’s impractical to diagnose every teenager in America with a sleep disorder. Additionally, some things abnormal in adults, like sleepwalking, are normal in kids.

With sleep issues so common, it’s difficult to know when your own problems with sleep warrant a closer look. Dr. Spencer recommends seeking professional help from your primary care doctor (who can refer you to a sleep specialist) if your problems are causing what she terms a “disturbance” in your social or work/school life. This would include students who can’t stay awake in class, adults whose social lives are compromised because they can’t stay awake during times of typical human interaction, or students who can’t remember what they’ve stayed up all night studying and so perform below their ability.

Could the answer to improved test scores, calmer conversations, better memory, fewer car accidents, increased ability to make good decisions, and even, as Bill Clinton suggested in 2007, less congressional gridlock be as simple as going to bed on time? Science appears to be answering in the affirmative. So go ahead, head to bed a little early tonight. You’ll be doing yourself (and maybe your friends) a favor. 🌙

FURTHER RESOURCES AND READS

- National Sleep Foundation (sleepfoundation.org)
- Cognition and Action Lab (cognacalab.com/wp)
- Test your sleep knowledge with this quiz: bit.ly/sleep-quiz
- Read this free curriculum from the National Institutes for Health for teaching about sleep (bit.ly/nihsleep). It’s designed to be taught in high school biology, but it’s free and anyone can use it.
- Doctors use the BEARS screening tool to assess sleep health in youth. You can find it at bit.ly/sleepbears.
- *Dreamland: Adventures in the Strange Science of Sleep* by David K. Randall
- *The Secret World of Sleep: The Surprising Science of the Mind at Rest* by Penelope Lewis

