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*The Deep Dive*

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By J.K. Rose

## The Enduring Mystery of Sleep

Sleep has long baffled us. Why is that we slip into a state of apparent coma each night for eight hours – of which we remember little, if anything at all? Is our need to sleep – and the 25 to 30 years, on average, that we spend doing it -- an evolutionary misstep or an essential function of our bodies?



## The Context

The ancient Greek philosophers had some curious theories about what caused our nightly slumber. Empedocles believed sleep was caused by a moderate cooling of the blood – and that total cooling of the blood would result in death. Diogenes of Apollonia believed we grew drowsy when “blood fills the vessels and pushes the air, which is contained inside them, toward the chest and downward in the belly.” Aristotle attributed sleepiness to the “evaporation” of ingested foods.

Over millennia, however, sleep fell from a subject of rumination and wonder to an object of scorn. In his 1758 essay, “The Way to Wealth,” Benjamin Franklin bemoaned sleep as a waste of time. “How much more than is necessary do we spend in sleep! ... there will be sleeping enough in the

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*Sleep is therapeutic  
for the body -- and  
the mind*

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grave.” (And how many of us moderns, faced with looming deadlines, have echoed Franklin’s “I’ll sleep when I’m dead” sentiment?)

Today, the reasons why we sleep remains an enigma. But scientists *have* discovered what happens when we don’t get enough of it: the shorter we sleep, the shorter we live. In the last 20 years, studies have revealed that habitually sleeping less than seven hours severely erodes our physical and mental health, dims our ability to learn and create, and even damage your [self-esteem](#).

Based on these startling findings, scientists are urging doctors to “prescribe sleep” for the nearly 80 million adult Americans who aren’t getting enough of it.

## The Nuance

In his bestselling book, [WHY WE SLEEP: Unlocking the Power of Sleep and Dreams](#), Matthew Walker, a neuroscientist and the director of U.C. Berkeley’s [Center for Human Sleep Science](#), argues that sleep loss is “greatest public health challenge we face in the 21<sup>st</sup> century.” “Sleep is the single most effective thing we can do to reset our brain and body health each day — Mother Nature’s best effort yet at contra-death,” Walker writes.

Sleep deprivation can have fatal consequences. Impaired judgment due to sleepiness was a significant factor in several of the worst human-made disasters of our time, including the nuclear meltdowns at Three Mile Island and Chernobyl, the grounding of the Exxon Valdez oil tanker and the explosion of the space shuttle Challenger.

On a more prosaic scale, the Institute of Medicine, a nonprofit affiliated with the National Academies of Science, estimates that drowsy driving is responsible for 20% of all vehicle collisions in the U.S.: that equals 1 million crashes, 500,000 injuries and 8,000 deaths each year.

For most of us, however, a sleep deficit will manifest itself in other unpleasant ways, Walker warns, such as:

- An inability to make new memories
- The buildup of a toxic protein called beta-amyloid, which can lead to Alzheimer’s
- A 200% greater risk a heart attack or a stroke in adults over 45
- A dip in testosterone that ages men by 10 to 15 years, causing virility problems
- A 20% drop in follicular-releasing hormones in women, leading to fertility issues
- A 70% reduction in natural anticancer fighting immune cells. (In fact, the World Health Organization classifies nighttime shift work as a [probably carcinogenic](#).)
- An increased desire to eat, which increases your risk for obesity and type 2 diabetes
- A 32% higher susceptibility to colds and flus
- Emotional irrationality (as any parent of a sleep-deprived toddler knows!)

## The Science

Two factors control your desire to sleep.

One is your circadian rhythm – the internal 24-hour clock that prompts you to feel heavy-headed after the sun sets. After dusk, your brain’s pineal gland secretes melatonin, aka the “vampire hormone,” into your bloodstream to relay the news that darkness has fallen and it’s time to sleep. The brain stops releasing melatonin after you perceive morning light – alerting you to wake up.

The second is a chemical called adenosine that creates “sleep pressure” in your brain; the longer you’re awake, the more adenosine is produced and the sleepier you feel. Try as you might to suppress it with a venti lattes or Red Bulls, adenosine continues to accumulate, and once your liver clears the caffeine from your system, you’ll be hit with an adenosine tsunami, resulting in a “caffeine crash” -- an overwhelming desire to sleep.

While you slumber, your sleep is divided between alternating 90-minute cycles of REM (“rapid eye movement”) sleep – in which the mind stays active and most of your dreaming occurs -- and NREM (non-REM), a deeper sleep that enhances memory and motor skills.

*On Ikaria, men are  
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American men.*

During REM sleep (equal to 20-25% of sleep time) fine-tunes its emotional circuits and suppresses muscle activity to prevent you from acting out your dream experiences. Getting sufficient REM sleep allows us to stay cool-headed and rational during the day. REM sleep also enhances our ability to learn and fuels our creativity.

While we are awake, our brains constantly acquire new information. The hippocampus serves as a short-term reservoir for this data, but, like our computer hard drives, the hippocampus has limited storage space. While we sleep, Walker found, bursts of brain waves called “sleep spindles” move recent memories from the hippocampus to long-term storage in the prefrontal cortex, thereby allowing us to continue acquiring knowledge. Conversely, short sleeping impairs our ability to learn new information.

But sleep doesn’t just enhance our ability to learn. It also acts as a kind of psychotherapist, Walker found, helping us forget painful memories or addictive cravings. “We can therefore learn and usefully recall salient life events without being crippled by the emotional baggage that those painful experiences originally carried,” he writes.

## What others are saying

But what should we make of CEOs who flaunt their ability to get by on four hours of shut-eye as if it were a super power? Although there are people who need less than six hours of sleep (due to a sub-variant of a gene called BHLHE41) they are extraordinarily rare. You’re probably not one of them. In fact, a 2016 RAND Corporation study found that insufficient sleep among employees costs U.S. businesses \$411 billion and 1.23 million lost workdays a year.

It’s normal to feel drowsy after lunch. “All humans, irrespective of culture or geographical location, have a genetically hardwired dip in alertness that occurs in the midafternoon hours,” Walker writes. Indeed, studies have found that a regular kip can prolong your life -- on the Greek isle of Ikaria, where daily siestas are the norm, local men are four times as likely to live until age 90 as American men. Post-prandial napping, once a fireable offense, has been embraced by companies from Zappos to HuffPo, which offer nap spaces to weary employees.

Although scientists and doctors agree that a solid night’s sleep is crucial, they don’t always agree how to achieve it. While the Internet is full of sleep hygiene tips (avoiding spicy meals, using sleeping masks, etc.), such cookie-cutter recommendations don’t work for everyone, says Britney Blair, a clinical psychologist, and board-certified sleep specialist.

“For people with insomnia, these fast and easy rules actually make sleep worse,” says Blair. “If you lay in bed and tell yourself to go to sleep, it’s never going to happen. It’s like holding a gun to your head.” In such cases, she recommends Cognitive Behavior Therapy for Insomnia, which analyzes a patient’s specific data (such as sleep stages and muscle activity) to customize a sleep plan. She outlines the benefits of CBTI for a specific patient here.

What about popping a Lunesta or an Ambien before bed? Not so fast, Blair warns. The problem with chemical sleep aids – in addition to the morning-after hangover --- is that they’re addictive. Users develop a tolerance to them over time and have to keep upping their dosage, making it harder for them to fall asleep naturally. Sleeping pills have also been linked to long-term cognitive damage: a few years ago, when the New York Times reported on a study showing higher rates of early-onset Alzheimer’s disease among users of sedative-hypnotics, Blair’s phone began to ring off the hook, she says. Today, about 70% of her patients are trying to wean themselves off of sleep medication.

## The Net Net

Besides being an answer to longevity, sleep is the greatest creative aphrodisiac and affects our every waking moment, dictates our social rhythm, and even mediates our negative moods.

Nevertheless, we tend to wear our ability to get by on little sleep as some sort of badge of honor that validates our work ethic. Science has proven the opposite to be true, something the wiser among of us have intuited for a long time. To quote the 17<sup>th</sup> century English dramatist Thomas Dekker, “Sleep is the golden chain that ties health and our bodies together.”

### More:

- Matthew Walker’s [Why We Sleep: Unlocking the Power of Sleep and Dreams](#)
- Britney Blair on the Science of Sleep: <https://vimeo.com/299678586/299565615>
- “[Sleep with Me](#),” the podcast of a San Francisco Librarian who reads boring bedtime stories for adults and has gained millions of fans