Building a Solid Foundation:

A Well-Rested Workforce is a Safer Workforce

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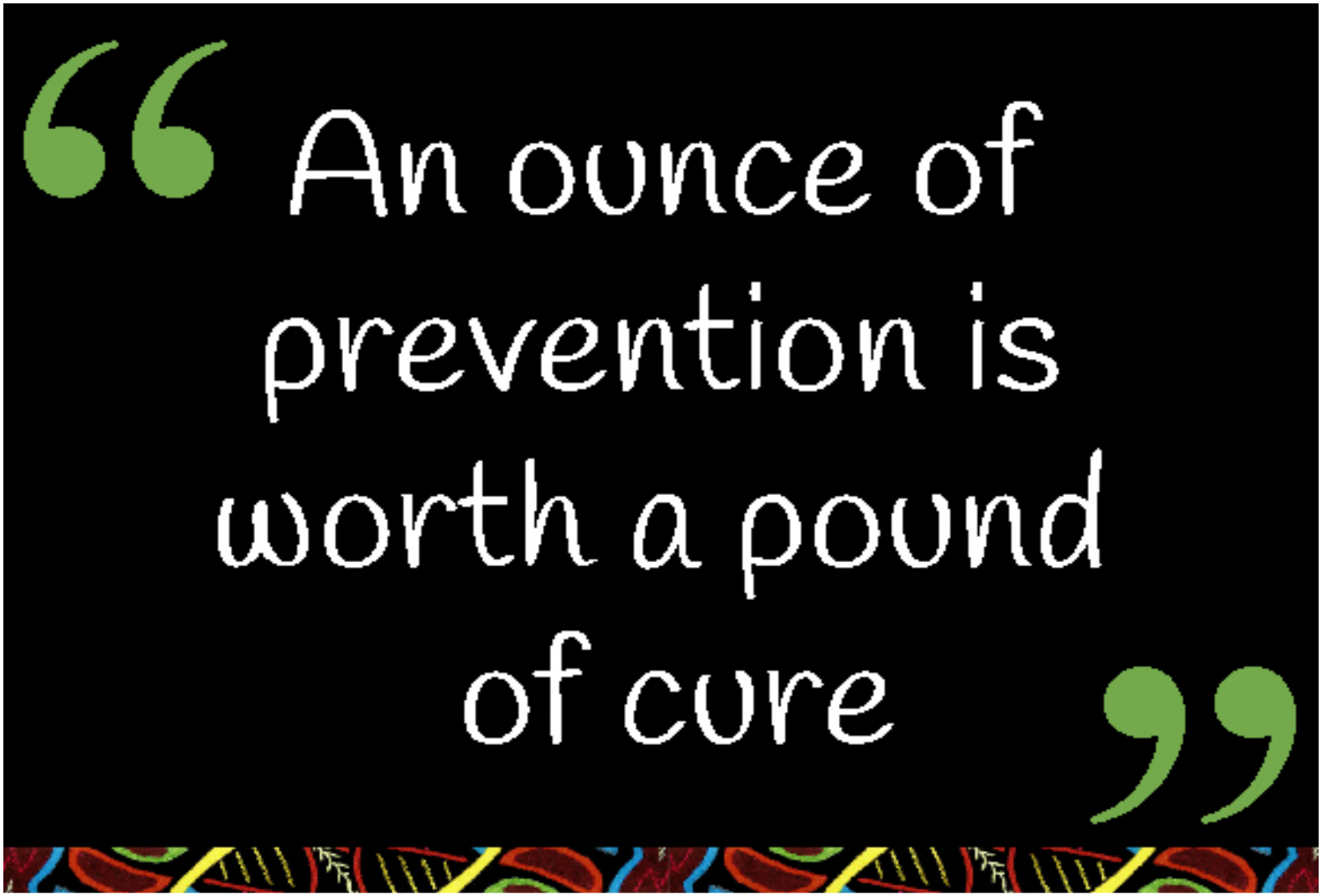
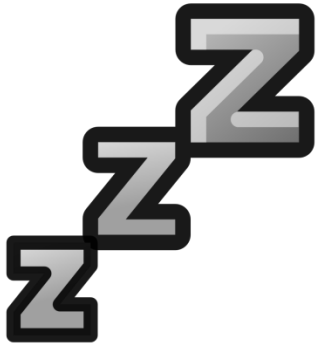
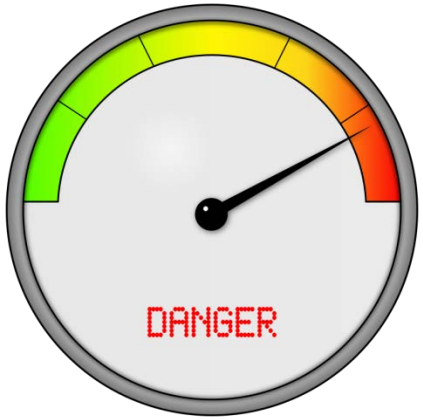

“An ounce of prevention is worth a pound of cure”

1,2,3...

Ever feel like this?



MAGNITUDE AND COST OF THE PROBLEM (Sleep Deprivation)



Insufficient Sleep Is a Public Health Problem

EPIDEMIC

Insufficient sleep is associated with a number of chronic diseases and conditions—such as diabetes, cardiovascular disease, obesity, and depression—which threaten our nation's health. Aside from these insufficient sleep is also responsible for motor vehicle and machinery-related crashes, causing substantial injury and disability each year.

More than one-quarter of the U.S. population report occasionally not getting enough sleep, while nearly 10% experience chronic insomnia. However, new methods for assessing and treating sleep disorders bring hope to the millions suffering from insufficient sleep. Getting sufficient sleep is not a luxury—it is a necessity—and should be thought of as a "vital sign" of good health. **CDC**

Fitful sleep, restless nights, hitting the alarm clock button for an additional 10 minutes of sleep—all are all too familiar manifestations of the interactions of life with one of the frontiers of science and clinical practice—somnology[1] and sleep medicine.

It is estimated that 50 to 70 million Americans suffer from a chronic disorder of sleep and wakefulness

NHLBI (National Heart, Lung, and Blood Institute) National Sleep Disorders Research Plan, 2003. Bethesda, MD: National Institutes of Health; 2003

Sleep loss and sleep disorders affect an individual's performance, safety, and quality of life.

Almost 20 percent of all serious car crash injuries in the general population are associated with driver sleepiness, independent of alcohol effects…

Sleep Disorders and Sleep Deprivation: An Unmet Public Health Problem.

…sleep loss and sleep disorders have a significant economic impact.

The high estimated costs to society of leaving the most prevalent sleep disorders untreated are far more than the costs that would be incurred by delivering adequate treatment...

Sleep Disorders and Sleep Deprivation: An Unmet Public Health Problem.

…Hundreds of billions of dollars a year are spent on direct medical costs associated with doctor visits, hospital services, prescriptions, and over-the-counter drugs.

Compared to healthy individuals, individuals suffering from sleep loss, sleep disorders, or both are less productive, have an increased health care utilization, and an increased likelihood of accidents.

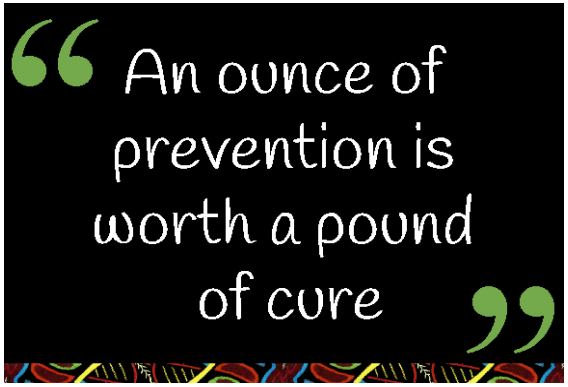
Sleep Disorders and Sleep Deprivation: An Unmet Public Health Problem.

Functional and Economic Impact of Sleep Loss and Sleep-Related Disorders

Although the data are limited, the effect of sleep disorders, chronic sleep loss, and sleepiness on accident rates, performance deficits, and health care utilization on the American economy is significant.

The high estimated costs to society of leaving the most prevalent sleep disorders untreated are far more than the costs that would be incurred by delivering adequate treatment.

Hundreds of billions of dollars are spent and/or lost annually as a result of poor or limited sleep. However, greater surveillance and analysis are required to estimate the full economic implications of these problems…



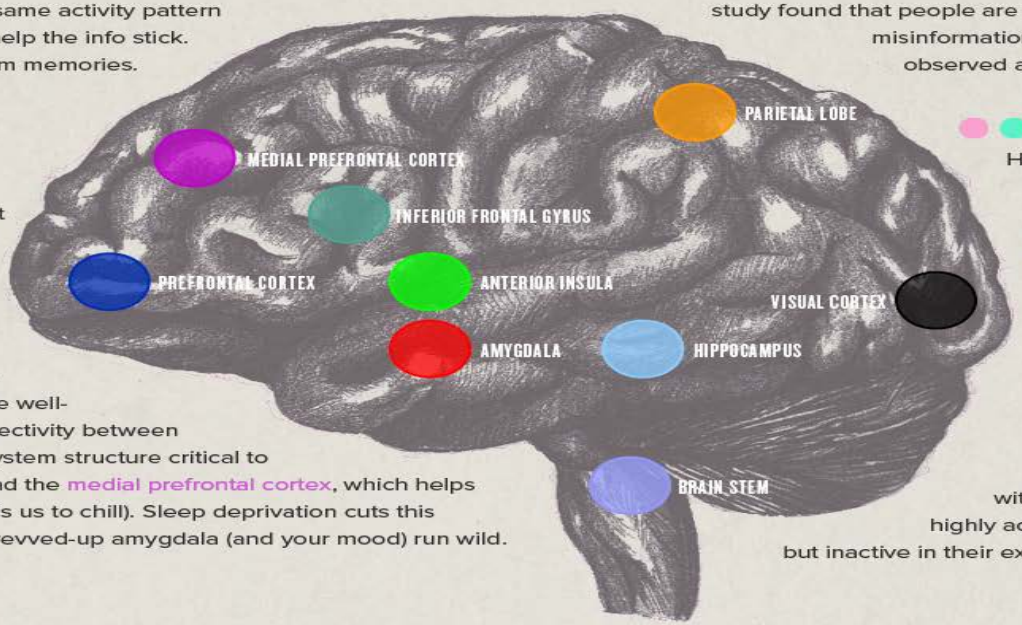
WHAT HAPPENS WHEN YOUR BRAIN DOESN'T SLEEP?

LOST MEMORIES

The hippocampus, a moon-shaped structure in the temporal lobe, exhibits a distinct pattern of neural activity when the waking mind encodes (learns) new information. Scientists believe our brain later "replays" the same activity pattern while we're sleeping to help the info stick. Lose sleep, lose long-term memories.

ANGER

Sleep loss primes us to focus on negative experiences, misinterpret facial expressions and pick fights. Emotional volatility may partly be a product of interrupted communication between brain regions. FMRI of the well-rested brain shows connectivity between the amygdala, a limbic system structure critical to emotional processing, and the medial prefrontal cortex, which helps regulate feelings (i.e., tells us to chill). Sleep deprivation cuts this connection, letting your revved-up amygdala (and your mood) run wild.



IMPAIRED WIT

When you skimp on sleep, the clever commentary may not flow so easily. Sleep loss affects cognitive processes like divergent thinking, which helps us switch topics nimbly during conversation. Scientists found that activity in the inferior frontal gyrus increases when sleep-deprived people tried to list uses for different objects, suggesting the brain draws on divergent thinking to compensate for strained cognitive functioning.

FALSE MEMORIES

The sleep-starved brain may fail to encode memories successfully in the first place, thanks to altered function in the hippocampus, as well as prefrontal cortex and parietal lobe regions. One study found that people are more likely to incorporate misinformation into memories of events observed after a night without sleep.

CEREBRAL SHRINKAGE

Healthy adults getting poor sleep lose volume in the frontal, temporal and parietal lobes, one study showed. Researchers don't yet understand if sleep loss causes shrinkage or vice versa.

SLURRED SPEECH

The temporal lobe, the brain region associated with language processing, is highly active in well-rested people but inactive in their exhausted and enunciation-challenged counterparts.

CRONUT BINGES

Sleep loss corresponds with decreased activity in the frontal lobe, which controls decision-making, and more activity in the amygdala, a key player in fear detection. Together, these neural changes create a brain mechanism that dulls judgment and ratchets up desire — the ideal mind-state for scarfing down fistfuls of bacon.

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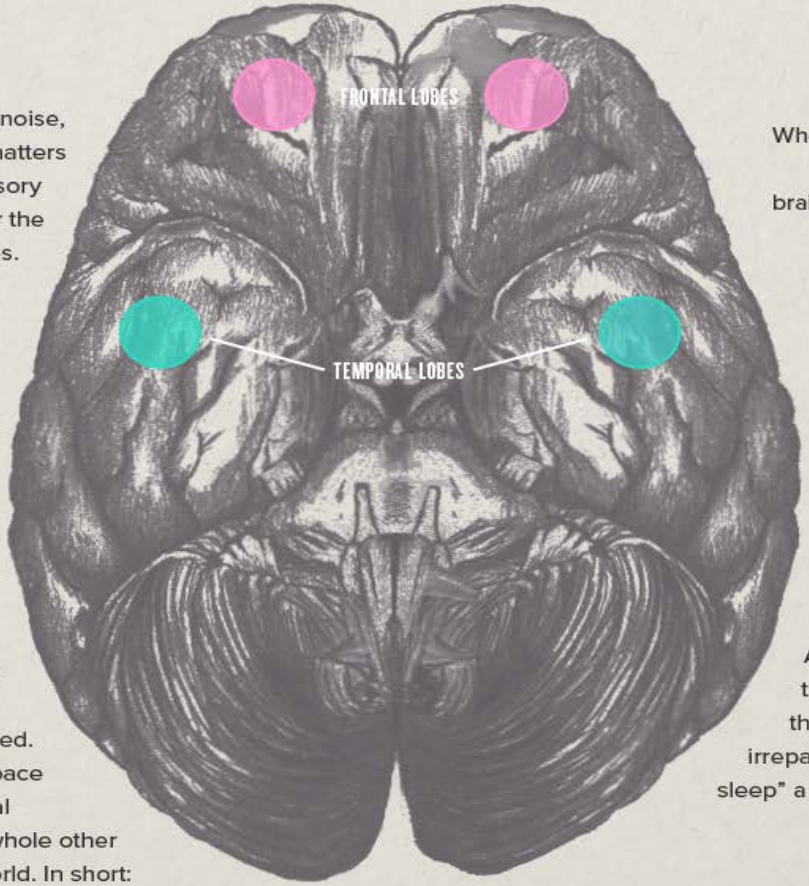
HALLUCINATIONS

The well-rested brain filters stimuli (noise, light, smell, etc.) to separate what matters from what doesn't and prevent sensory overload. When the brain can't filter the information coming in, chaos ensues. After pulling an all-nighter, people may begin to anticipate things that aren't there, including objects.



RISKY DECISIONS

When sleep-deprived people prepare to make economic decisions, the brain's reward center in the prefrontal cortex lights up, suggesting they expect to win (e.g., make money). But when risky choices don't pan out, people's brain activity decreases in the region related to punishment and aversion (the anterior insula), suggesting they don't care about losing money as much as they would on a good night's sleep.

HEAD IN THE CLOUDS

We all lose focus now and then, but brain activity linked to attention lapses changes when people sacrifice sleep. After a good night's rest, these lapses correspond to altered thalamus function and less-active frontal and parietal networks, which basically means we tune out when we're bored. But when sleep-deprived people space out, they also exhibit impaired visual sensory processing, suggesting a whole other level of disengagement with the world. In short: Losing sleep turns you into Phoebe from Friends.

BRAIN DAMAGE

Add all-nighters to the list of things that kill brain cells — in this case, in the brain stem. The damage may be irreparable, making "catching up on lost sleep" a poor excuse for snoozing till noon on the weekends.

.Mic

Sources for infographic: Research from The Journal of Neuroscience, International Scholarly Research Notes, Experimental Brain Research, Psychological Bulletin, UC Berkeley Walker Sleep Lab, PNAS, International Journal of Occupational Medicine and Environmental Health, The Centers of Disease and Prevention, SLEEP, PLOS One, Psychological Science, Frontiers in Human Neuroscience, NeuroImage

One in five U.S. adults shows signs of chronic sleep deprivation, and a shortage of sleep has been linked to health problems as different as diabetes and Alzheimer's disease.

Recent studies have found some interesting connections between illness and what is happening in our brains as we snooze.

Sources: Neurologist Clifford Saper of Harvard Medical School, BrainFacts.org, Massachusetts General Hospital, Weizmann Institute of Science, American…

THE SLEEPING BRAIN

While our bodies rest, our brains are very active, but in different ways from when we are awake. Sleep is divided into four stages, and a typical adult cycles through these several times during the night, skipping Stage 3, deepest sleep, as morning approaches.

Stage 1: Falling asleep

Brain waves slow, muscles may contract sharply a few times and then relax. You may experience a sensation of falling. If something wakes you, you may be unaware you've been asleep.

Stage 2: Light sleep

Body temperature and heart rate decrease. High-frequency "sleep spindles" appear in brain waves. The spindles are evidence of communication between the prefrontal cortex and thalamus, which could help the brain process memories.

Stage 3: Deepest sleep

Hormones are released, triggering functions such as restoring energy, repairing tissues, regulating appetite and strengthening the immune system. If you walk or talk in your sleep, you'll probably do it during Stage 3.

Stage 4: REM sleep

Now, we dream. In "rapid-eye movement" sleep, the eyes are active and the brain is more so. Faster brain waves return, as if we're awake. Our limbs become temporarily paralyzed, so we don't act out our dreams. Newborns spend half their sleep time in REM sleep, elderly adults only 15 percent.

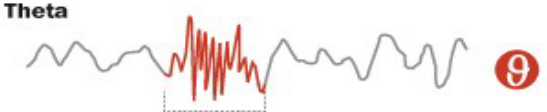
TYPES OF BRAIN WAVES

As we fall asleep, brain waves slow from irregular, staccato beta waves to more relaxed alpha and theta waves. Low-frequency delta waves indicate the deepest sleep. Once we reach REM sleep, where we dream, brain waves become more rapid and erratic, similar to when we are awake.

Beta

Alpha

Theta



Sleep spindle
High-frequency bursts called sleep spindles signal that the brain is moving into deep sleep.

Delta

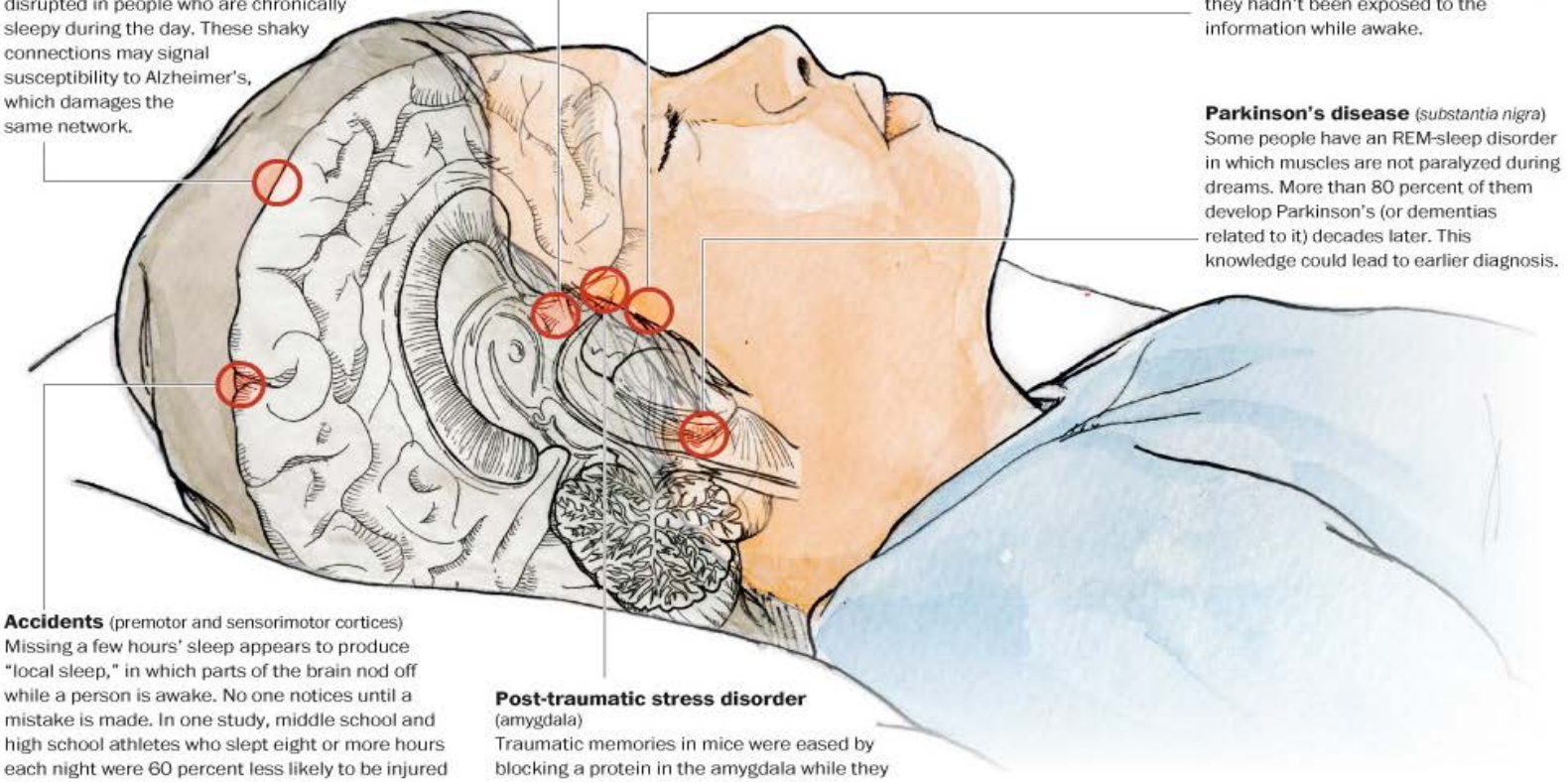
WHAT RECENT STUDIES SAY ABOUT SLEEP AND THE BRAIN

Alzheimer's disease (regions involved in research: parts of cortex, hippocampus)
Two studies hint at early warnings: When Alzheimer's plaques begin to build in the brains of mice, their sleep is disrupted, suggesting that poor sleep may be one of the first signs of the disease. Also, connections between areas of a network used in daydreaming and introspection are disrupted in people who are chronically sleepy during the day. These shaky connections may signal susceptibility to Alzheimer's, which damages the same network.

Narcolepsy (hypothalamus)
The onset of the disorder, which causes daytime sleep attacks, may be triggered by flu or strep. It develops during an autoimmune response in which the body kills off a particular group of cells in the hypothalamus.

Obesity and diabetes (hypothalamus)
People short on sleep (four hours per night) spend a lower percentage of their sleep in Stage 2 and REM sleep and feel hungrier, crave more sweet and salty foods, and consume more calories than those who sleep longer.

Memory and learning (hippocampus)
Just two hours of lost sleep in one night can keep the hippocampus from turning information from the day before into long-term memories. REM sleep in particular is vital to learning because that appears to be when the brain weeds out irrelevant information. In one study, people learned to associate tones with smells while they slept even though they hadn't been exposed to the information while awake.



Parkinson's disease (*substantia nigra*)
Some people have an REM-sleep disorder in which muscles are not paralyzed during dreams. More than 80 percent of them develop Parkinson's (or dementias related to it) decades later. This knowledge could lead to earlier diagnosis.

Accidents (premotor and sensorimotor cortices)
Missing a few hours' sleep appears to produce "local sleep," in which parts of the brain nod off while a person is awake. No one notices until a mistake is made. In one study, middle school and high school athletes who slept eight or more hours each night were 60 percent less likely to be injured playing sports than those who slept less.

Post-traumatic stress disorder (amygdala)
Traumatic memories in mice were eased by blocking a protein in the amygdala while they slept, possibly leading to new treatments.

Scientists have found yet another reason we should all be napping at work… Doze SF and nap rooms

- Sleep deprivation is linked to a lot of scary things like Alzheimer's disease, depression, memory problems, and cancer - and while a nap won't completely make up for hours of lost sleep, scientists agree a power nap can do wonders.

- In past studies naps have been shown to improve immune health, energy and mood, and cognitive function. Now a new study from the University of Michigan links naps during typical waking hours to improved emotional control.

- Sleep deprivation has been linked to increased impulsive responses to frustrating obstacles and decreased levels of emotional intelligence and constructive thinking. Simply put, studies show that the **longer people are awake, the lower the likelihood that they can regulate their emotional responses.**

- During the recent University of Michigan study, researchers found napping to increase frustration tolerance and decrease feelings of impulsivity in participants.

- The researchers asked participants to perform various computer-based behavioural exercises and answer questions about their sleepiness, mood, and impulsivity. Then they either watched a 60-minute nature documentary or were allowed to take an hour-long nap. They then repeated the computer tasks.

- Researchers found participants who didn't nap were less willing to endure a frustratingly unsolvable task and reported feeling more impulsive, while those who did nap showed more tolerance for frustration and reported feeling less impulsive.

- But the problem with these kinds of recommendations, as psychologist Ron Friedman explained to Business Insider, is that they're not entirely practical.

- The author of *The Best Place To Work* has long been a proponent for on-the-job napping, but he said that he debated whether or not to recommend this in his book since many struggle with office space constraints and cultural attitudes about napping.

- "Particularly in American culture, we like to believe that productivity is a function of effort, and that if we work hard we'll produce," he said. **"But the reality is that we have a biological need for rest no different or less important than our need for food or water."**

- Friedman believes the solution **begins at the top, and leaders can model better attitudes about sleep by creating restoration rooms in the office and encouraging people to use them**.

SLEEPLESS AMERICA ACCIDENTS

Social costs With these considerations in mind, it is amazing how little our culture values sleep. Not having time to sleep, or seeming to need less sleep than average, is often worn as a badge of honor. “The sad fact,” says Rosekind (2013), “is that for all the information we have on the perils of fatigue, American society still characterizes pushing the sleep envelope as ‘hardworking,’ ‘resultsoriented,’ and ‘dedicated’.”

The result? “As a society,” says UBC’s Coren, “we are chronically sleep-deprived.” William Dement, Ph.D., author of **The Promise of Sleep**, asserts that lack of adequate sleep is the number one health problem facing our nation today (1999). Here are a few examples of other social costs of this epidemic:

Each year 10,000 fatalities occur on our roads.

Sleep deprivation is the leading cause of all fatal accidents involving trucks and mass transportation.

In one study, over **50% of North Carolina drivers involved in car accidents had slept less than 6 hours the night before**.

In 1989, the Exxon Valdez ran aground and spilled **11 million gallons of oil**. The captain was drunk at the time of the wreck. But he was in his cabin. The man at the wheel? **A very sleepy third mate**.

Before the space shuttle Challenger took off, NASA was running people on 12-18 hour shifts.

The twelve managers at the table, listening to their engineers' advice about the advisability of take-off, were each **18 hours sleep-deprived**.

The engineers presented the evidence: "The O-rings won't hold." But the managers were so drowsy, Coren holds, **that they could not process the information**.

SLEEPLESS AMERICA

A HEALTH REPORT

Getting too little shut-eye can significantly alter your body's processes enough to predispose you to gain **weight**.

8 Triggers That Change Your Metabolism
By Jennifer Acosta Scott | Medically reviewed by Lindsey Marcellin, MD, MPH

Here’s a detailed look into sleep deprivation

What increases and what decreases

Physical and cognitive effects

Physical health decays	Physical performance declines
↓ Immunity	Reaction time ↓
↑ Susceptibility to infection	Balance ↓
↑ Blood pressure	Coordination ↓
↓ Growth hormone levels	Risk of injury ↑

Cognitive power diminishes	Mental health suffers
Concentration ↓	↑ Anxiety
Memory ↓	↑ Irritability
Analytic ability ↓	↑ Optimism
Judgement ↓	↓ Confidence

Sleep is your first line of defense

"There was a recent study where healthy volunteers were subjected to poor sleep," West says. "Even over one night, the lack of sleep was significant enough to disrupt their metabolic patterns and give them more **insulin resistance**, which is a risk factor for **diabetes**."

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Insulin resistance has also been associated with **obesity**. To increase the chances of boosting metabolism, adults should get

seven to nine hours of sleep each night.

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When a teen stays awake for 11 days straight ...things got CREEPY

WAY Back in 1965, 16-year-old high school student Randy Gardner stayed awake for 11 days and 24 minutes - that's 264.4 hours straight.

SOME GREAT PRESENTATIONS ON THE SCIENCE AND IMPORTANCE OF SLEEP

Jeff Lliff’s
One more reason to get a good night's sleep

The brain uses a quarter of the body's entire energy supply, yet only accounts for about two percent of the body's mass.

So how does this unique organ receive and, perhaps more importantly, rid itself of vital nutrients?

Arianna Huffington - How to Succeed? Get more Sleep

Arianna Huffington shares a small idea that can awaken much bigger ones…

the power of a good night's sleep. Instead of bragging about our sleep deficits, she urges us to shut our eyes and see the big picture…

Russell Foster's TED Talk on Why We Need Sleep?

Russell Foster is a circadian neuroscientist. He studies the sleep cycles of the brain.

What do we know about sleep?

Equinox President Sarah Robb O'Hagan

You travel a lot for your job. What are some of your traveling tips?

"Well, I'm really disciplined around my sleep, and I have learned a lot about sleep since I've been at the company. So when I'm at a hotel room, I cover my alarm clock, because if you don't the lights will actually disturb your sleep, especially when you are in a different time zone. So I cover the alarm clock, and I also don't look at devices a half-hour before I go to bed, which is hard but it makes a really big difference. I also work out with my own body clock. I always work out here [in the States] in the morning, but over there [in London], I work out in the evening because it's kind of like the American morning. You know? So I usually find it's just easier for your body to not get startled."

Equinox President Sarah Robb O'Hagan

Right, that makes sense.

“It’s funny, too. We are studying sleep a lot in terms of programming for our members.

We’ve learned that there’s such a huge connection between good sleep and good, healthy bodies.

And in terms of even people who are trying to lose weight or get in shape, having a good night sleep is a huge part of making that happen because if you don’t, and you go into the club to work out, you’re actually making it harder for lean body muscle mass to develop because you haven’t recovered properly.”

Equinox President Sarah Robb O’Hagan

Sleep: Why Successful Entrepreneurs Snooze More and Work Less

FIRAS KITTANEH – CONTRIBUTOR - Entrepreneur • CEO at Amerisleep • Sleep Evangelist

1. **Create a healthy sleep schedule.**

Analyze your day, from when you wake up to the time you lie down at night. Understanding how your day works and where you're using your time will allow you to build a sleep schedule that perfectly suits your needs.

The average adult needs anywhere from seven to nine hours of sleep a night to feel well rested.

- Allowing for that magical eight hours will give you enough time to get to sleep and account for interruptions. Usually, we're not aware of how much we're actually sleeping because our tossing and turning is interrupting our sleep…

2. Trim down your workplace duties.

This may be difficult for those in the early stages of building a company, but setting aside sleep time for yourself will help your business thrive. If you have people under you or beside you who can assume some of your responsibilities, let them absorb some of your workload.

If that's not possible, evaluate your workload and see what is time sensitive and what you can divert to later. Life will always throw new challenges, goals and deadlines at you, but prioritizing sleep starts by prioritizing your workday.

3. Sneak in sleep when you can.

If your schedule is extremely demanding, try to grab a nap whenever possible. It has been shown that short, ten-to-20-minute naps can improve cognitive functions. Any nap longer than 20 minutes, however, can kick you into REM sleep, which causes you to feel groggy if you are woken up in the middle of it.

Try to take a nap before 3 pm to avoid delaying your bedtime later in the day. Drinking coffee before a nap can also help wake you up before the 20-minute mark. This works because coffee takes approximately that amount of time to work itself into your bloodstream and perk you up.

Make sure to block out as much sun and noise wherever you're napping so that you get to sleep as quickly as possible. Distractions can ruin a nap's effectiveness. Let your coworkers know you're napping so all interactions can be halted while you're catching up on your sleep.

4. Make the time you have to sleep more efficient.

- No matter how much time you dedicate to sleep, it is important to make that time efficient. The first thing to do when trying to get to bed, then, is ditch the technology.

- A **nightly ritual** will also encourage your body to associate whatever you do late at night with bedtime This could be as simple as setting out your clothes for the next day, reading or taking a shower. **The key thing is to have a way to tell your body it is time to sleep.**

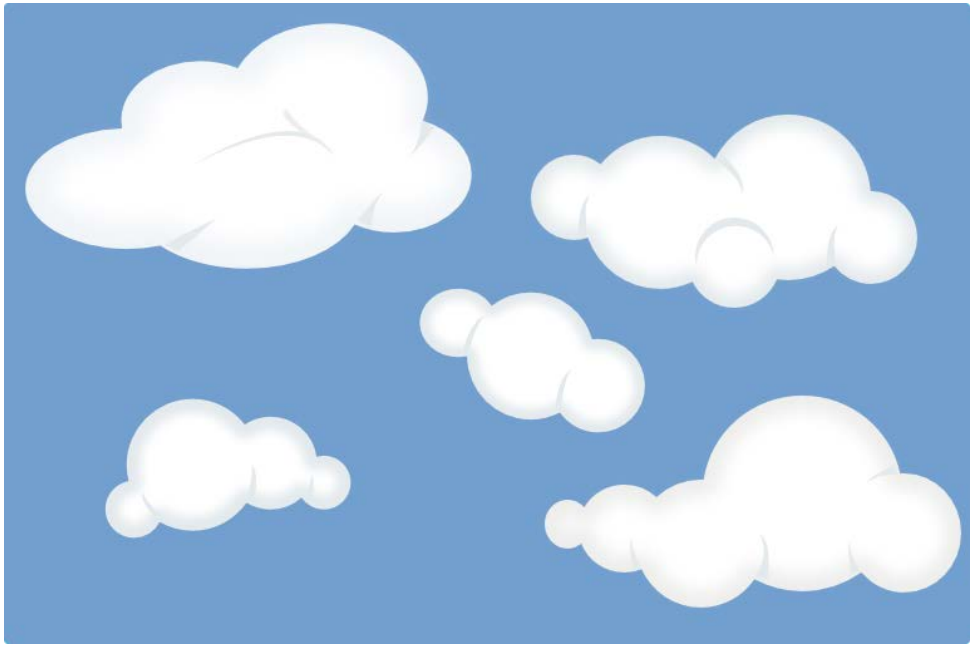
- Then, once you're in bed, focus on rest, not your next day's goals. Being under lots of pressure forces people to use any downtime to problem solve or plan for the future. **But focusing on sleep will ease your mind and make it easier to fall asleep.**

5. Embrace sleep and prosper.

Doing as much as possible with your day may be desirable, but a nonstop mentality will have serious effects down the road for your productivity. Catching up on sleep here and there doesn’t make up for long-term sleep deprivation, as many believe. "Sleeping in" on the weekends won’t repair the damage from poor sleep habits during the week, either.

The message here: Make sleep a priority in your career and you’ll feel more alert and happier and ready to impact the world with your new ideas and opportunities.

Summary



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