

The Steep Cost of Sleep Deprivation

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STORY AT-A-GLANCE

- › Sleep deprivation has the same effect on your immune system as physical stress or illness and increases your risk of numerous chronic diseases, including obesity, insulin resistance, diabetes and Alzheimer's
- › Research confirms that sleep is an important factor in children's risk for diabetes, and that children need far more sleep than adults. Even at eight hours a night, children were at increased risk of obesity and insulin resistance when compared to those who slept up to 12 hours or more
- › Babies have improved recall after napping, suggesting sleep plays an important role in memory solidification. Amyloid plaques, common in Alzheimer's disease, also build up more quickly when you're sleep-deprived

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What I have learned since this article was initially posted is that if you supply your body, and your brain specifically, with enough near infrared light, the average person will need 48 minutes less of sleep per night. I currently sleep less than six hours a night as per Oura ring sleep tracking data. I rarely use an alarm and have more than enough energy throughout the day. I will be posting more details on near IR light later this year.

Sleep deprivation has the same effect on your immune system as physical stress or illness, which helps explain why lack of sleep has been shown to raise your risk of numerous chronic diseases. Sleep is also intricately tied to important hormone levels, including melatonin – an antioxidant with powerful anticancer activity – which is

diminished by lack of sleep, and to brain detoxification and rejuvenation, which only occur during deep sleep.

Cutting just one hour of sleep a night increases the expression of genes associated with inflammation, immune excitability, diabetes, cancer risk and stress.¹ A single night of poor sleep has also been shown to impair your physical movements and mental focus to a degree comparable to having a blood alcohol level of 0.10%.² In other words, lack of sleep can result in a level of impairment on par with someone who's drunk.

Sleeping well is also important for maintaining emotional balance. Fatigue compromises your brain's ability to regulate emotions, making you more prone to crankiness, anxiety and unwarranted emotional outbursts.³ Small adjustments to your daily routine and sleeping area can go a long way to ensure uninterrupted, restful sleep and, thereby, better health.

One of the worst things you can do is to reach for a sleeping pill. Research shows these drugs do not work and can have serious side effects. One analysis found that popular sleeping pills reduced the average time it takes to fall asleep by a mere 13 minutes compared to placebo, while increasing total sleep time by 11 minutes. Such results are typical.

Meanwhile, research^{4,5} shows people who take sleeping pills have a 35% higher risk for certain cancers and are nearly four times as likely to die from any cause as nonusers. These are significant risks for mere minutes of additional sleep.

What Science Tells Us About the Ramifications of Sleep Deprivation

According to an analysis⁶ of available research by the American Academy of Sleep Medicine and the Sleep Research Society, the weight of the evidence suggests adults need somewhere between seven and nine hours of sleep each night for optimal health, with the Goldilocks' Zone being right around eight hours.

They also determined that consistently sleeping less than six hours a night increases your risk for a wide range of psychological and physical effects. In addition to exacerbating any chronic ailment you may already have, poor sleep or lack of sleep also directly contributes to:⁷

Increased risk of car accidents. In 2013, drowsy drivers caused 72,000 car accidents in which 800 Americans were killed; 44,000 were injured⁸

Increased risk of cardiovascular disease. African-American have a higher risk of heart disease than Caucasians and as much as 50% of this racial difference has been linked to blacks getting less sleep⁹

Premature birth; sleep deprived mothers have double the risk of delivering more than six weeks early than mothers who sleep well¹⁰

Reduced ability to learn or remember and lowered academic performance. Even infants have improved recall after napping, suggesting sleep plays a role in solidifying memories¹¹

Reduced ability to perform tasks and reduced productivity. According to research, workers sleeping less than six hours per night costs the U.S. \$411 billion annually in lost productivity¹²

Reduced creativity at work or in other activities

Increased risk of obesity and Type 2 diabetes

Increased susceptibility to stomach ulcers

Increased risk of cancer

Increased risk of high blood pressure

Increased risk of osteoporosis

Increased accidents at work

Reduced athletic performance

Premature aging by interfering with growth hormone production, normally

released by your pituitary gland during deep sleep

Increased risk of depression and anxiety.¹³ In one trial, 87% of depressed patients who resolved their insomnia had major improvements to their depression, with symptoms disappearing after eight weeks

Increased risk of dementia and Alzheimer's disease¹⁴

Decreased immune function

Increased risk of dying from any cause

Lack of Sleep Raises Your Risk of Obesity

A number of studies have demonstrated that lack of sleep can play a significant role in obesity, insulin resistance and Type 2 diabetes – all of which are at epidemic levels not only in the U.S. but around the world.

The link between sleep deprivation and weight gain is explained by the fact that sleep affects hunger-related hormones. Studies show poor sleep increases ghrelin, which results in increased hunger, while simultaneously inhibiting leptin, the hormone that signals your brain when you're "full."

This combination results in increased hunger and food cravings, especially for carbohydrates. According to one study,^{15,16,17} getting one extra hour of sleep per night may reduce your waist size by one-third of an inch. Compared to people who averaged just under six hours of sleep per night, those who slept an average of 8.45 hours per night (plus or minus 40 minutes) were roughly 7 pounds lighter on average, and had a waist circumference averaging 1.6 inches smaller.

Another study published in the International Journal of Obesity¹⁸ found that infants who sleep less eat more, which places them at increased risk of future obesity and related

health problems. Infants who, at the age of 16 months, slept less than 10 hours per day ate an average of 10% more calories than those who slept for at least 13 hours daily.¹⁹

Sleep Deprivation Ups Diabetes Risk in Both Young and Old

Research²⁰ also confirms that sleep is an important factor in children's risk for diabetes. A British team evaluated more than 4,500 children aged between 9 and 10 years of varying ethnic backgrounds. On average, their parents reported the children slept between eight and 12 hours, with the average sleep time being 10 hours.

Previous studies have shown children need more sleep than adults and this study confirms that view. Even at eight hours a night, children were at increased risk of obesity and insulin resistance when compared to those who slept the most.

According to senior author Christopher Owen, a professor of epidemiology at St. George's University of London, for children, more sleep is better, and there's really no upper threshold. He told *The New York Times*,²¹ "Increasing sleep is a very simple, low-cost intervention. We should be doing our utmost to make sure that children sleep for an adequate amount of time."

Other research²² involving adults found that women who slept five hours or less per night were 34% more likely to develop diabetes symptoms than women who slept for seven or eight hours each night.

Another study²³ published in the *Annals of Internal Medicine* found that after just four nights of sleep deprivation (sleep time was only 4.5 hours per night), study participants' insulin sensitivity was 16% lower and their fat cells' insulin sensitivity was 30% lower, rivaling levels seen in full-blown diabetics.

Senior author Matthew Brady, an associate professor of medicine at the University of Chicago, noted,²⁴ "This is the equivalent of metabolically aging someone 10 to 20 years just from four nights of partial sleep restriction. Fat cells need sleep, and when they don't get enough sleep, they become metabolically groggy."

Sleep Deprivation and Dementia

Lack of sleep or poor sleep has also been linked to an increased risk for dementia and Alzheimer's disease, the latter of which is now the third leading cause of death in the U.S. Researchers from University of California Berkeley's Sleep and Neuroimaging Lab discovered that a lack of sleep leaves you more vulnerable to buildup of amyloid beta proteins in the brain, associated with dementia.²⁵ Needless to say, chronic sleep deprivation is particularly risky.²⁶

Problematically, amyloid beta deposits also hinder your ability to sleep, thus trapping you in a vicious cycle. Lead author Bryce Mander, Ph.D., neuroscientist from the University of California Berkeley was quoted in California Association UC Berkeley magazine, saying:²⁷

"What was unknown was whether or not that's just a side relationship that has nothing to do with the clinical symptoms of dementia, or if sleep disruption is part of why these toxic chemicals in the brain are causing memory loss. This is not to say that amyloid and other pathologies can't impact memory independent of sleep. But it does suggest that part of the way it impacts memory is through sleep-dependent memory."

As mentioned above, research shows that babies have improved recall after napping, suggesting sleep plays an important role in memory solidification.²⁸ Other research demonstrates that amyloid plaques, common in Alzheimer's disease, build up more quickly in sleep-deprived lab animals. Other important research discovered that sleep clears toxins from your brain during deep sleep, which is really important for the prevention of Alzheimer's.²⁹

Light Pollution and EMF Decrease Sleep Quality and Quantity

If you've ever gone camping, you've likely noticed a change in your sleep quality. Chances are you slept deeper and arose more rested. Aside from factors such as grounding to the earth and spending time in fresh air and nature, the most influential

factor resulting in better sleep is the drastic reduction in exposure to artificial lights and electromagnetic fields (EMFs).

Exposure to light at night interrupts your circadian clock and melatonin level, both of which play a role in how deeply you sleep and how well-rested you feel the next day. LEDs and fluorescent lights are particularly troublesome because the blue light peaks are not balanced by red and near-infrared.³⁰ Incandescent lights are safer, as they emit red and near-infrared wavelengths and very few blue wavelengths.

Even very dim light during sleep (such as that from a nightlight or alarm clock) can have a detrimental effect on your sleep quality and quantity, and can negatively affect your cognition the next day.³¹ Ideally, avoid electronic screens and predominantly blue light such as LEDs in the evening. Alternatively, use blue-blocking glasses. I've included a recommendation below for an inexpensive pair that work really well.

Similarly, EMFs emitted from wiring, electronic devices and Wi-Fi, for example, impair your melatonin secretion and harm your mitochondria by producing oxidative damage. EMF exposure has also been linked to neuronal changes that affect memory and the ability to learn.³²

Importantly, research^{33,34,35,36} by Martin Pall, Ph.D., suggests **microwave radiation** from wireless technology may be a causative factor in Alzheimer's, depression, anxiety and more. It can also seriously hamper your sleep.

As early as nearly 20 years ago it had been well-documented in over 15 studies³⁷ that exposure to microwave radiation from cellphones, Wi-Fi, ELF and magnetic fields from improper wiring in your bedroom can disrupt melatonin production and deep sleep. There are far more studies confirming this now that can easily be documented by doing a pub med search.

EMF Remediation May Improve Your Sleep

Eliminating EMF exposure can be tricky, as most homes are flooded with electric currents and microwave radiation. Still, you can reduce it to some degree, depending on

how far you're willing to go. Here are some suggestions that may improve your sleep quality:

Turn off your Wi-Fi at night. Ideally turn off your Wi-Fi permanently and only use wired connections.

You can also pull your circuit breaker to your bedroom before bed as this will decrease magnetic fields in your bedroom which will lower your melatonin. Ideally it would be best to have a remote cut off switch to disconnect the power to your bedroom.

Avoid running electrical cords underneath your bed. Especially avoid plugging in any transformers (power supplies) within 6 feet of your bed.

Move alarm clocks and other electrical devices away from your head, or ideally out of the room. Not only do they create pernicious electric fields but they also shine unnecessary light in your room.

So how do you know what time it is? Good question. I picked up a talking clock³⁸ designed for the visually impaired to solve the problem. If you have your phone in your room it simply MUST be in airplane mode if it is within 30 feet of your bed or you will be blasted with microwave radiation all night long.

Avoid sleeping with your head against a wall that contains unshielded electric wiring and/or electric meters, circuit breaker panels, televisions or stereos on the other side. Move your bed 3 feet away from the wall, install an EMF faraday cage canopy over your bed to shield against microwaves and turn off the power breaker to your bedroom to minimize electric and magnetic fields.

Avoid using electronic media for at least an hour or more before bed. If you do use them after sunset, be sure to use a blue light filter. The research is quite clear that people who use smartphones and computers, especially in the evening but also during the daytime, are more likely to report insomnia.³⁹ One 2008 study⁴⁰ revealed

that people exposed to cellphone radiation for three hours before bedtime had more trouble falling asleep and staying in a deep sleep.

Other Tips That Can Help Improve Your Sleep Quality

Increasing the number of hours you sleep to eight each night and improving your quality of sleep may help to significantly reduce health risks associated with sleep deprivation.

Below are several suggestions that may help.^{41,42}

Turn your bedroom into an oasis for sleep — Your bed is a place to sleep and rest comfortably. Anything else, such as work, computers, cells phones or watching television will reduce the quality of your sleep. Reduce any noisy interruptions from pets or outdoor activities. You might consider removing your pet from the bedroom or using a white noise machine to reduce interruptions from outdoor noises.

Establish a soothing pre-bedtime routine — Activities such as a warm bath, reading a good book or relaxation exercises may help you fall asleep easier. If you have trouble falling to sleep one night, it's better to leave the bedroom and read quietly than to try even harder to fall asleep. I would strongly recommend using blue-blocking glasses if you do this, to prevent your reading light from further depressing your melatonin production.

Keep a consistent schedule — Going to bed and waking up at the same time every day allows your body to become accustomed to the routine. This helps regulate your circadian clock so you fall asleep and stay asleep all night. Keep this routine even on the weekends.

Get plenty of bright sunlight exposure in the morning and at noon — Exposure to bright light first thing in the morning stops production of the sleep-inducing hormone melatonin and signals to your body that it's time to wake up. Outdoor sunlight is best, so you might even want to take a quick walk outside.

Not only will this increase in physical activity help you sleep later, but taking your walk outdoors – either first thing in the morning or around noon when the sun is high – gives you more exposure to bright sunlight, which helps anchor your circadian clock.

At sundown, dim your lights (and/or use amber-colored glasses) – In the evening (around 8 p.m.) you'll want to dim your lights and turn off electronic devices. Normally, your brain starts secreting melatonin between 9 p.m. and 10 p.m., and these devices emit light that may stifle that process. After sundown, shift to a low-wattage incandescent bulb with yellow, orange or red light if you need illumination.

A salt lamp illuminated by a 5-watt incandescent bulb is an ideal solution that will not interfere with your melatonin production. If using a computer or smartphone, install blue light-blocking software like [Iris](#) – an improved version of f.lux.

The easiest solution, however, is to use amber-colored glasses that block blue light. I found an Uvex model ([S1933X](#)) on Amazon that costs just \$15.52 and eliminates virtually all blue light. This way you don't have to worry about installing programs on all your devices or buying special light bulbs for evening use. Once you have your glasses on, it doesn't matter what light sources you have on in your house.

Exercise daily – Your body thrives on exercise and movement. It reduces your risk of cardiovascular disease and metabolic disorders. Exercise will help you get to sleep more easily and sleep more soundly. However, your body also releases cortisol during exercise, which may reduce your melatonin secretion. Exercise at least three hours before bed, and earlier if you can.

Keep your room cool – The optimal temperature for sleeping is between 60 and 68 °F. If your room is cooler or warmer, you may have a more restless night's sleep.⁴³ During sleep your body's core temperature drops to the lowest level during a 24-hour period. The cooler your room is, the more conducive it may be to your body's natural drop in temperature.

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