



What Happens When You Sleep?

When we sleep well, we wake up feeling refreshed and alert for our daily activities. Sleep affects how we look, feel and perform on a daily basis, and can have a major impact on our overall quality of life.

To get the most out of our sleep, both quantity and quality are important. We need at least 7 hours—and on average 8 hours—a night of uninterrupted sleep to leave our bodies and minds rejuvenated for the next day. If sleep is cut short, the body doesn't have time to complete all of the phases needed for muscle repair, memory consolidation and release of hormones regulating growth and appetite. Then we wake up less prepared to concentrate, make decisions, or engage fully in school and social activities.

How Does Sleep Contribute to All of These Things?

Sleep architecture follows a pattern of alternating REM (rapid eye movement) and NREM (non-rapid eye movement) sleep throughout a typical night in a cycle that repeats itself about every 90 minutes.

What role does each state and stage of sleep play?

NREM (80% of night): As we begin to fall asleep, we enter NREM sleep, which is composed of stages 1 through 3:

- Stage N1
- Stage N2
- Stage N3
- Stage REM

Stage N1 (5% of Sleep Time)

- Between being awake and falling asleep
- Light sleep

Stage N2 (55% of Sleep Time)

- Onset of sleep
- Becoming disengaged from surroundings
- Breathing and heart rate are regular
- Body temperature drops (so sleeping in a cool room is helpful)

Stages N3 (often referred to as Delta Wave or Slow Wave Sleep) (20% of Sleep Time)

- Deepest and most restorative sleep
- Blood pressure drops
- Breathing becomes slower
- Muscles are relaxed
- Blood supply to muscles increases
- Tissue growth and repair occurs
- Energy is restored
- Hormones are released, such as: Growth hormone, essential for growth and development, including muscle development

Stage REM (20% of Sleep Time)

First occurs about 90 minutes after falling asleep and recurs about every 90 minutes, getting longer later in the night. First period of REM Sleep is for about 2/4 minutes.

- Provides energy to brain and body
- Supports daytime performance
- Brain is active, and dreams occur
- Eyes dart back and forth
- Body becomes immobile and relaxed, as muscles are turned off

In addition, levels of the hormone cortisol dip at bed time and increase over the night to promote alertness in morning.

Sleep helps us thrive by contributing to a healthy immune system, and can also balance our appetites by helping to regulate levels of the hormones ghrelin and leptin, which play a role in our feelings of hunger and fullness. So when we're sleep deprived, we may feel the need to eat more, which can lead to weight gain.

The one-third of our lives that we spend sleeping, far from being "unproductive," plays a direct role in how full, energetic and successful the other two-thirds of our lives can be.

What the Research Says About Sleep Duration

The first thing experts will tell you about sleep is that there is no "magic number." Not only do different age groups need different amounts of sleep, but sleep needs are also individual. Just like any other characteristics you are born with, the amount of sleep you need to function best may be different for you than for someone who is of the same age and gender. While you may be at your absolute best sleeping seven hours a night, someone else may clearly need nine hours to have a happy, productive life. In fact, a 2005 study confirmed the fact that sleep needs vary across populations, and the study calls for further research to identify traits within genes that may provide a "map" to explain how sleep needs differ among individuals.

Another reason there is "no magic number" for your sleep results from two different factors that researchers are learning about: a person's basal sleep need – the amount of sleep our bodies need on a regular basis for optimal performance – and sleep debt, the accumulated sleep that is lost to poor sleep habits, sickness, awakenings due to environmental factors or other causes. Two studies suggest that healthy adults have a basal sleep need of seven to eight hours every night, but where things get complicated is the interaction between the basal need and sleep debt. For instance, you might meet your basal sleep need on any single night or a few nights in a row, but still have an unresolved sleep debt that may make you feel more sleepy and less alert at times, particularly in conjunction with circadian dips, those times in the 24-hour cycle when we are biologically programmed to be more sleepy and less alert, such as overnight hours and mid-afternoon. You may feel overwhelmingly sleepy quite suddenly at these times, shortly before bedtime or feel sleepy upon awakening. The good news is that some research suggests that the accumulated sleep debt can be worked down or "paid off."

Though scientists are still learning about the concept of basal sleep need, one thing sleep research certainly has shown is that sleeping too little can not only inhibit your productivity and ability to remember and consolidate information, but lack of sleep can also lead to serious health consequences and jeopardize your safety and the safety of individuals around you.

For example, short sleep duration is linked with:

- Increased risk of motor vehicle accidents
- Increase in body mass index – a greater likelihood of obesity due to an increased appetite caused by sleep deprivation

- Increased risk of diabetes and heart problems
- Increased risk for psychiatric conditions including depression and substance abuse
- Decreased ability to pay attention, react to signals or remember new information

According to researchers Michael H. Bonnet and Donna L. Arand, “There is strong evidence that sufficient shortening or disturbance of the sleep process compromises mood, performance and alertness and can result in injury or death. In this light, the most common-sense ‘do no injury’ medical advice would be to avoid sleep deprivation.”

Sleep and Age

Cognitive decline is a part of life. Much in the same way skin or hair degrade with old age, so does the brain. Over time, oxidative and other stressors put dents and dings in your neurons, making the brain as a whole less efficient.

Sleep quality also declines with age. Teenagers typically spend around 20% of their sleep time in slow-wave sleep (the deepest, most restorative sleep). The elderly, however, experience much less — some studies show they average around 0-5%. The elderly also experience more time in light sleep and more interrupted sleep.

DISCLAIMER: While every effort is made to ensure medical accuracy, this paper should not be used to diagnose or treat a sleep disorder. In all cases the advice of a properly qualified medical practitioner should be sought.

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