

## Why sleep is important and what happens when you don't get enough

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### Importance of sleep

Sleep is essential for a person's health and wellbeing, according to the National Sleep Foundation (NSF). Yet millions of people do not get enough sleep and many suffer from lack of sleep. For example, surveys conducted by the NSF (1999-2004) reveal that at least 40 million Americans suffer from over 70 different sleep disorders and 60 percent of adults report having sleep problems a few nights a week or more. Most of those with these problems go undiagnosed and untreated. In addition, more than 40 percent of adults experience daytime sleepiness severe enough to interfere with their daily activities at least a few days each month - with 20 percent reporting problem sleepiness a few days a week or more. Furthermore, 69 percent of children experience one or more sleep problems a few nights or more during a week.

### What are the signs of excessive sleepiness?

According to psychologist and sleep expert David F. Dinges, Ph.D., of the Division of Sleep and Chronobiology and Department of Psychiatry at the University of Pennsylvania School of Medicine, irritability, moodiness and disinhibition are some of the first signs a person experiences from lack of sleep. If a sleep-deprived person doesn't sleep after the initial signs, said Dinges, the person may then start to experience apathy, slowed speech and flattened emotional responses, impaired memory and an inability to be novel or multitask. As a person gets to the point of falling asleep, he or she will fall into micro sleeps(5-10 seconds) that cause lapses in attention, nod off while doing an activity like driving or reading and then finally experience hypnagogic hallucinations, the beginning of REM sleep. (Dinges, *Sleep, Sleepiness and Performance*, 1991)

## **Amount of sleep needed**

Everyone's individual sleep needs vary. In general, most healthy adults are built for 16 hours of wakefulness and need an average of eight hours of sleep a night. However, some individuals are able to function without sleepiness or drowsiness after as little as six hours of sleep. Others can't perform at their peak unless they've slept ten hours. And, contrary to common myth, the need for sleep doesn't decline with age but the ability to sleep for six to eight hours at one time may be reduced. (Van Dongen & Dinges, *Principles & Practice of Sleep Medicine*, 2000)

## **What causes sleep problems?**

Psychologists and other scientists who study the causes of sleep disorders have shown that such problems can directly or indirectly be tied to abnormalities in the following systems:

### **Physiological systems**

- Brain and nervous system
- Cardiovascular system
- Metabolic functions
- Immune system

Furthermore, unhealthy conditions, disorders and diseases can also cause sleep problems, including:

- Pathological sleepiness, insomnia and accidents
- Hypertension and elevated cardiovascular risks (MI, stroke)
- Emotional disorders (depression, bipolar disorder)
- Obesity; metabolic syndrome and diabetes
- Alcohol and drug abuse

(Dinges, 2004)

Groups that are at particular risk for sleep deprivation include night shift workers, physicians (average sleep = 6.5 hours a day; residents = 5 hours a day), truck drivers, parents and teenagers. (American Academy of Sleep Medicine and National Heart, Lung, and Blood Institute Working Group on Problem Sleepiness. 1997).

## **How environment and behavior affect a person's sleep**

Stress is the number one cause of short-term sleeping difficulties, according to sleep experts. Common triggers include school- or job-related pressures, a family or marriage problem and a serious illness or death in the family. Usually the sleep problem disappears when the stressful situation passes. However, if short-term sleep problems such as insomnia aren't managed properly from the beginning, they can persist long after the original stress has passed.

Drinking alcohol or beverages containing caffeine in the afternoon or evening, exercising close to bedtime, following an irregular morning and nighttime schedule,

and working or doing other mentally intense activities right before or after getting into bed can disrupt sleep.

If you are among the 20 percent of employees in the United States who are shift workers, sleep may be particularly elusive. Shift work forces you to try to sleep when activities around you - and your own "biological rhythms" - signal you to be awake. One study shows that shift workers are two to five times more likely than employees with regular, daytime hours to fall asleep on the job.

Traveling also disrupts sleep, especially jet lag and traveling across several time zones. This can upset your biological or "circadian" rhythms.

Environmental factors such as a room that's too hot or cold, too noisy or too brightly lit can be a barrier to sound sleep. And interruptions from children or other family members can also disrupt sleep. Other influences to pay attention to are the comfort and size of your bed and the habits of your sleep partner. If you have to lie beside someone who has different sleep preferences, snores, can't fall or stay asleep, or has other sleep difficulties, it often becomes your problem too!

Having a 24/7 lifestyle can also interrupt regular sleep patterns: the global economy that includes round the clock industries working to beat the competition; widespread use of nonstop automated systems to communicate and an increase in shift work makes for sleeping at regular times difficult.

### **Health problems and sleep disorders**

A number of physical problems can interfere with your ability to fall or stay asleep. For example, arthritis and other conditions that cause pain, backache, or discomfort can make it difficult to sleep well.

Epidemiological studies suggest self-reported sleep complaints are associated with an increased relative risk of cardiovascular morbidity and mortality. For women, pregnancy and hormonal shifts including those that cause premenstrual syndrome (PMS) or menopause and its accompanying hot flashes can also intrude on sleep.

Finally, certain medications such as decongestants, steroids and some medicines for high blood pressure, asthma, or depression can cause sleeping difficulties as a side effect.

It is a good idea to talk to a physician or mental health provider about any sleeping problem that recurs or persists for longer than a few weeks.

According to the DSM IV, some psychiatric disorders have fatigue as a major symptom. Included are: major depressive disorder (includes postpartum blues), minor depression, dythymia, mixed anxiety-depression, SAD and bipolar disorder.

### **Teenagers, sleep problems and drugs**

According to a long-term study published in the 2004 April issue of *Alcoholism: Clinical and Experimental Research*, young teenagers whose preschool sleep habits were poor were more than twice as likely to use drugs, tobacco or alcohol. This

finding was made by the University of Michigan Health System as part of a family health study that followed 257 boys and their parents for 10 years. The study found a significant connection between sleep problems in children and later drug use, even when other issues such as depression, aggression, attention problems and parental alcoholism were taken into account. Long-term data on girls isn't available yet. The researchers suggest that early sleep problems may be a "marker" for predicting later risk of early adolescent substance abuse—and that there may be a common biological factor underlying both traits. Although the relationship between sleep problems and the abuse of alcohol in adults is well known, this is the first study to look at the issue in children.

### **Children and Sleep Disturbances**

**Nightmares** are dreams with vivid and disturbing content. They are common in children during REM sleep. They usually involve an immediate awakening and good recall of the dream content.

**Sleep terrors** are often described as extreme nightmares. Like nightmares, they most often occur during childhood, however they typically take place during non-REM (NREM) sleep. Characteristics of a sleep terror include arousal, agitation, large pupils, sweating, and increased blood pressure. The child appears terrified, screams and is usually inconsolable for several minutes, after which he or she relaxes and returns to sleep. Sleep terrors usually take place early in the night and may be combined with sleepwalking. The child typically does not remember or has only a vague memory of the terrifying events.

### **Sleepiness and Decision Making**

In the August 2004 issue of the journal *Sleep*, Dr. Timothy Roehrs, the Director of research at the Sleep Disorders and Research Center at Henry Ford Hospital in Detroit published one of the first studies to measure the effect of sleepiness on decision making and risk taking. He found that sleepiness does take a toll on effective decision making.

Cited in the October 12, *New York Times Science* section, Dr. Roehrs and his colleagues paid sleepy and fully alert subjects to complete a series of computer tasks. At random times, they were given a choice to take their money and stop. Or they could forge ahead with the potential of either earning more money or losing it all if their work was not completed within an unknown remainder of time.

Dr. Roehrs found that the alert people were very sensitive to the amount of work they needed to do to finish the tasks and understood the risk of losing their money if they didn't. But the sleepy subjects chose to quit the tasks prematurely or they risked losing everything by trying to finish the task for more money even when it was 100 percent likely that they would be unable to finish, said Dr. Roehrs.

## **Consequences of lost sleep**

According to the National Commission on Sleep Disorders Research (1998) and reports from the National Highway Safety Administration (NHSA)(2002), high-profile accidents can partly be attributed to people suffering from a severe lack of sleep.

Each year the cost of sleep disorders, sleep deprivation and sleepiness, according to the NCSDR, is estimated to be \$15.9 million in direct costs and \$50 to \$100 billion a year in indirect and related costs. And according to the NHSA, falling asleep while driving is responsible for at least 100,000 crashes, 71,000 injuries and 1,550 deaths each year in the United States. Young people in their teens and twenties, who are particularly susceptible to the effects of chronic sleep loss, are involved in more than half of the fall-asleep crashes on the nation's highways each year. Sleep loss also interferes with the learning of young people in our nation's schools, with 60 percent of grade school and high school children reporting that they are tired during the daytime and 15 percent of them admitting to falling asleep in class.

According to the Department of Transportation (DOT), one to four percent of all highway crashes are due to sleepiness, especially in rural areas and four percent of these crashes are fatal.

Risk factors for drowsy driving crashes:

1. Late night/early morning driving
2. Patients with untreated excessive sleepiness
3. People who obtain six or fewer hours of sleep per day
4. Young adult males
5. Commercial truck drivers
6. Night shift workers
7. Medical residents after their shift

## **How to get a good night sleep**

According to sleep researchers, a night's sleep is divided into five continually shifting stages, defined by types of brain waves that reflect either lighter or deeper sleep. Toward morning, there is an increase in rapid eye movement, or REM sleep, when the muscles are relaxed and dreaming occurs, and recent memories may be consolidated in the brain. The experts say that hitting a snooze alarm over and over again to wake up is not the best way to feel rested. "The restorative value of rest is diminished, especially when the increments are short," said psychologist Edward Stepanski, PhD who has studied sleep fragmentation at the Rush University Medical Center in Chicago. This on and off again effect of dozing and waking causes shifts in the brain-wave patterns. Sleep-deprived snooze-button addicts are likely to shorten their quota of REM sleep, impairing their mental functioning during the day. (*New York Times*, October 12, 2004)

Certain therapies, like cognitive behavioral therapy teach people how to recognize and change patterns of thought and behavior to solve their problems. Recently this type of therapy has been shown to be very effective in getting people to fall asleep and conquer insomnia.

According to a study published in the October 2004 issue of *The Archives of Internal Medicine*, cognitive behavior therapy is more effective and lasts longer than a widely used sleeping pill, Ambien, in reducing insomnia. The study involved 63 healthy people with insomnia who were randomly assigned to receive Ambien, the cognitive behavior therapy, both or a placebo. The patients in the therapy group received five 30-minute sessions over six weeks. They were given daily exercises to “recognize, challenge and change stress-inducing” thoughts and were taught techniques, like delaying bedtime or getting up to read if they were unable to fall asleep after 20 minutes. The patients taking Ambien were on a full dose for a month and then were weaned off the drug. At three weeks, 44 percent of the patients receiving the therapy and those receiving the combination therapy and pills fell asleep faster compared to 29 percent of the patients taking only the sleeping pills. Two weeks after all the treatment was over, the patients receiving the therapy fell asleep in half the time it took before the study and only 17 percent of the patients taking the sleeping pills fell asleep in half the time. (*New York Times*, October 5, 2004)

According to leading sleep researchers, there are techniques to combat common sleep problems:

- Keep a regular sleep/wake schedule
- Don't drink or eat caffeine four to six hours before bed and minimize daytime use
- Don't smoke, especially near bedtime or if you awake in the night
- Avoid alcohol and heavy meals before sleep
- Get regular exercise
- Minimize noise, light and excessive hot and cold temperatures where you sleep
- Develop a regular bed time and go to bed at the same time each night
- Try and wake up without an alarm clock
- Attempt to go to bed earlier every night for certain period; this will ensure that you're getting enough sleep

### **Insomnia and cognitive-behavioral treatment**

In clinical settings, cognitive-behavior therapy (CBT) has a 70-80 percent success rate for helping those who suffer from chronic insomnia. Almost one third of people with insomnia achieve normal sleep and most reduce their symptoms by 50 percent and sleep an extra 45-60 minutes a night. When insomnia exists along with other psychological disorders like depression, say the experts, the initial treatment should address the underlying condition.

But sometimes even after resolving the underlying condition, the insomnia still exists, says psychologist Jack Edinger, Ph.D., of the VA Medical Center in Durham, North Carolina and Professor of Psychiatry and Behavioral Sciences at Duke University and cautions that treating the depression usually doesn't resolve the sleep difficulties. From his clinical experience, he has found that most patients with insomnia should be examined for specific behaviors and thoughts that may perpetuate the sleep problems. When people develop insomnia, they try to compensate by engaging in activities to help them get more sleep. They sleep later in the mornings or spend excessive times in bed. These efforts usually backfire, said Edinger.

From his clinical work and research on sleep, psychologist Charles M. Morin, Ph.D., a Professor in the Psychology Department and Director of the Sleep Disorders Center at University Laval in Quebec, Canada says that ten percent of adults suffer from chronic insomnia. In a study released in the recent issue of *Sleep Medicine Alert* published by the NSF, Morin outlines how CBT helps people overcome insomnia. Clinicians use sleep diaries to get an accurate picture of someone's sleep patterns. Bedtime, waking time, time to fall asleep, number and durations of awakening, actual sleep time and quality of sleep are documented by the person suffering from insomnia.

A person can develop poor sleep habits (i.e. watching TV in bed or eating too much before bedtime), irregular sleep patterns (sleeping too late, taking long naps during the day) to compensate for lost sleep at night. Some patients also develop a fear of not sleeping and a pattern of worrying about the consequences of not sleeping, said Morin. "Treatments that address the poor sleep habits and the faulty beliefs and attitudes about sleep work but sometimes," said Morin, "medication may play a role in breaking the cycle of insomnia. But behavioral therapies are essential for patients to alter the conditions that perpetuate it."

CBT attempts to change a patient's dysfunctional beliefs and attitudes about sleep. "It restructure thoughts – like, 'I've got to sleep eight hours tonight' or 'I've got to take medication to sleep' or 'I just can't function or I'll get sick if I don't sleep.' These thoughts focus too much on sleep, which can become something like performance anxiety – sleep will come around to you when you're not chasing it," said Edinger.

What works in many cases, said Morin and Edinger, is to standardize or restrict a person's sleep to give a person more control over his or her sleep. A person can keep a sleep diary for a couple of weeks and a clinician can monitor the amount of time spent in bed to the actual amount of time sleeping. Then the clinician can instruct the patient to either go to bed later and get up earlier or visa versa. This procedure improves the length of sleeping time by imposing a mild sleep deprivation situation, which has the result of reducing the anxiety surrounding sleep. To keep from falling asleep during the day, patients are told not to restrict sleep to less than five hours.

Standardizing sleep actually helps a person adjust his or her homeostatic mechanism that balances sleep, said Edinger. "Therefore, if you lose sleep, your homeostatic mechanism will kick in and will work to increase the likelihood of sleeping longer and deeper to promote sleep recovery. This helps a person come back to their baseline and works for the majority."

A person can also establish more stimulus control over his or her bedroom environment, said Dr Morin. This could include: going to bed only when sleepy, getting out of bed when unable to sleep, prohibiting non-sleep activities in the bedroom, getting up at the same time every morning (including weekends) and avoiding daytime naps.

Finally, a person can incorporate relaxation techniques as part of his or her treatment. For example, a person can give herself or himself an extra hour before bed to relax and unwind and time to write down worries and plans for the following day.

In CBT, said Morin, breaking the thought process and anxiety over sleep is the goal. “After identifying the dysfunctional thought patterns, a clinician can offer alternative interpretations of what is getting the person anxious so a person can think about his or her insomnia in a different way.” Morin offers some techniques to restructure a person’s cognitions. “Keep realistic expectations, don’t blame insomnia for all daytime impairments, do not feel that losing a night’s sleep will bring horrible consequences, do not give too much importance to sleep and finally develop some tolerance to the effects of lost sleep.

According to Dr. Edinger, aging weakens a person’s homeostatic sleep drive after age 50. Interestingly, the length of the circadian cycle stays roughly the same over the lifespan but the amplitude of the circadian rhythm may decline somewhat with aging.

## **Resources**

National Sleep Foundation

<http://www.sleepfoundation.org>

American Academy of Sleep Medicine

<http://www.aasmnet.org>

American Insomnia Association

<http://www.americaninsomniaassociation.org>

Sleep Research Society

<http://www.sleepresearchsociety.org>

NIH National Center for Sleep Disorders Research

<http://www.nhlbi.nih.gov/sleep>

The MayoClinic.com Sleep Center

(Blake, et al, Psychological Reports, 1998; National Heart, Lung and Blood Institute Working Group on Insomnia, 1998)

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