



WHAT HAPPENS IF YOU DO NOT GET ENOUGH SLEEP?

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YOUNG REVIEWERS:



HILA
AGE: 14



YAIR
AGE: 13

Good sleep is essential for a healthy lifestyle. The official recommendations for the length of a night's sleep range from 7 to 9 h for adults and 10–13 h for children, depending on age. Based on this recommendation, many children and adolescents around the world do not get the recommended amount of sleep. In this article, we will review the reasons why young people are not getting enough sleep, discuss the effects of lack of sleep on brain function and emotions, and emphasize the benefits of adequate sleep for improving mood and optimizing performance in school. We will also examine how delaying the start of the school day could help increase overall sleep hours and reduce the negative consequences of sleep deprivation.

DO MOST PEOPLE GET ENOUGH SLEEP?

Sleep is an essential part of maintaining a healthy lifestyle, vital for all age groups—from infants and children to older adults. Insufficient sleep has both short- and long-term effects. In the short term, we all feel tired and uncomfortable when we do not sleep enough. In the long term, experts have found that regular lack of sleep is linked to a reduction in overall health. Sleep is essential for growth, physical and mental health, **cognitive functioning**, and mood balance. Although sleep's importance has been proven, lack of sleep is still a worldwide problem, especially for adolescents.

The fundamental question is: how much sleep do we really need? Sleep associations around the world are trying to figure this out. The answer actually varies from person to person. Experts say that you should sleep enough to feel refreshed and alert during the day. For most of us, this means at least 9h of sleep per night at elementary school age, and 8h per night in adolescence [1]. Official recommendations state the following guidelines for children and adolescents: 10–13h for 3–5-year-olds, 9–12h for elementary school-aged children (6–12 years), and 8–10h for middle school- and high school-aged kids (Figure 1) [2].

COGNITIVE FUNCTION

A set of skills of the mind, as opposed to other types of skills such as motor skills. Some examples of cognitive function are logical reasoning, abstract thinking, and mental arithmetic.

Figure 1

The recommended amount of sleep hours changes throughout our lives. As we get older, wakefulness occupies an increasing part of the day, and the required sleep time shortens (Image credit: American Academy of Sleep Medicine).

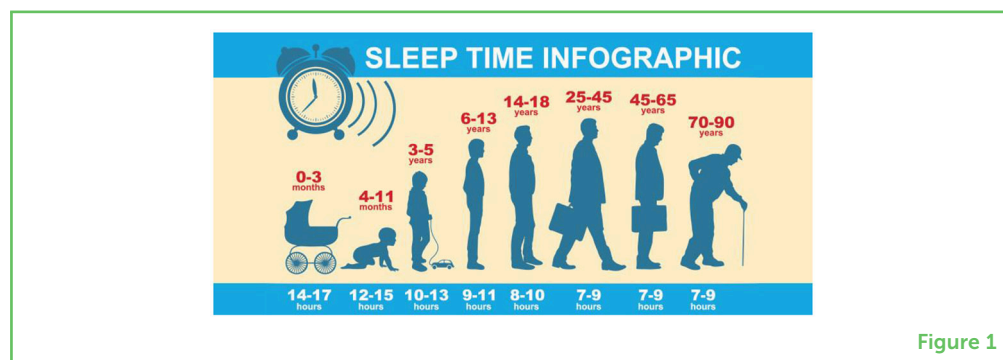


Figure 1

A related question is: what time should we go to bed? In general, there is no specific recommended time—only to go to bed when you are tired. However, as much as possible, it is very important to go to bed at the same time each night. Most young children go to bed around 8 pm and will fall asleep in <15 min. Adolescents often need fewer hours of sleep, but they will benefit if they go to bed around 10 pm. The key is to balance getting enough sleep with not lying awake in bed for too long.

Unfortunately, many children and adolescents do not get the recommended number of sleep hours. Several studies have shown that adolescents tend to sleep less as they get older. For example, 16% of 6th graders reported that they sleep <8h a night; among 12th graders, the rate rose to 75% [1]. A study conducted in the USA from 2016 to 2018, examining the number of sleep hours in infants, children, and adolescents between the ages of 4 months and 17 years, found

SLEEP DEPRIVATION

A condition of not having adequate duration and/or quality of sleep to support decent alertness, performance, and health. It can be either chronic or acute.

INSOMNIA

A condition characterized by difficulty falling asleep or poor-quality sleep. Insomnia causes excessive daytime sleepiness and difficulty functioning.

Figure 2

Chronic sleep disorders are known as insomnia, and they are characterized by difficulty falling asleep and poor-quality sleep. Insomnia can lead to sleep deprivation. The reasons for insomnia include: taking certain medications; chronic diseases, including migraines and headaches; psychiatric disorders such as depression; consuming fatty foods and/or eating a large meal before bed; taking stimulants such as caffeine or tobacco in the form of cigarettes; bad habits such as using screens and electronic media close to bedtime (Image credit: Yulia Baranych, taken from iStock free online images).

BIOLOGICAL CLOCK

An internal brain mechanism that measures time and regulates several body processes. It is influenced by light and darkness and operates in a cycle of about 24 h.

that about 35% of participants slept less than recommended for their age [3].

WHAT IS KEEPING US AWAKE?

There are many reasons that **sleep deprivation** is a worldwide phenomenon and these reasons can vary from person to person [1, 4]. Difficulties related to falling asleep, i.e., **insomnia**, can stem from various factors. However, every one of us can relate to at least one or two factors, and we might be able to change some of them to get more sleep (Figure 2).

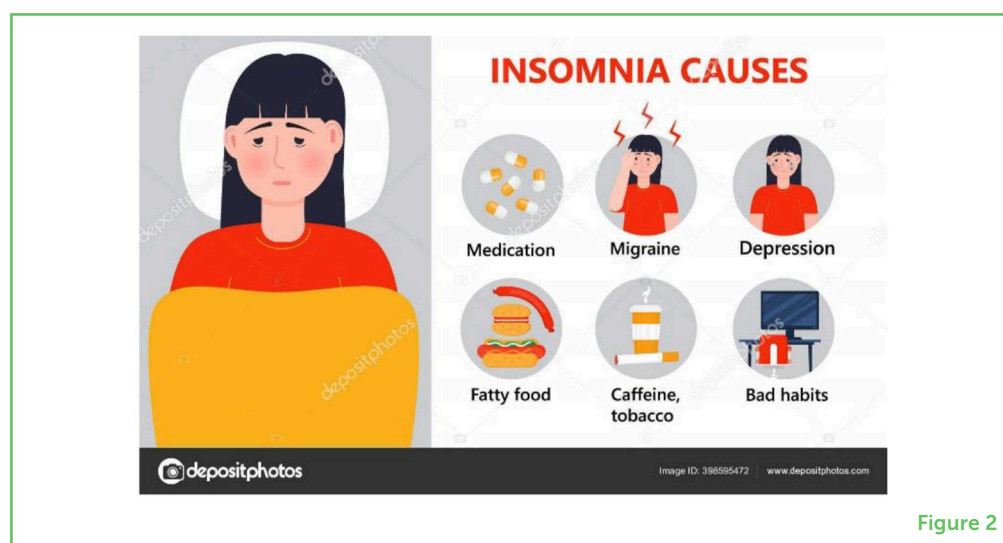


Figure 2

Biological Factors

Many changes happen in the body during puberty, including changes to the **biological clock**. One function of the biological clock is to control the timing between the sleep cycle and wakefulness. During puberty, there is a delay in the timing of the start and end of the sleep period, meaning kids want to stay up later and sleep later in the morning. Why does this happen? The **pineal gland**, located in the brain, produces a hormone called **melatonin** every evening. Melatonin, also known as the "hormone of darkness", tells the body that it is time to go to sleep. During puberty, the production of melatonin is delayed, so teenagers tend to go to bed later and get up later.

We can see the biological clock at work in a common phenomenon known to many of us—**jet lag**. Jet lag is a temporary sleep disorder resulting from a rapid transition between time zones. It takes about half a day for the human body to get used to each hour of time difference between the point of origin and the destination point. That is, for a time difference of 6 h, we will experience jet lag for 3 days. As a result, we will be awake at the "wrong" hours, which makes it very difficult to function.

PINEAL GLAND

A small, pea-shaped gland deep in the center of the brain. The pineal gland secretes the hormone melatonin in response to changes in light and darkness.

MELATONIN

A hormone secreted by the pineal gland that regulates the body's response to changes in light during the day. It plays an important role in sleep and wakefulness.

JET LAG

A sleep disorder resulting from the rapid transition between different time zones. It is most common on long-distance flights when there is a temporary mismatch between the circadian rhythm and the local time. Symptoms include feelings of fatigue and sleepiness, that usually resolve after a few days.

CAFFEINE

The most consumed stimulant in the world, found naturally in various plants. Many foods and beverages contain caffeine, including chocolate, coffee, cola, energy drinks, and more.

Certain Diseases

Migraines, allergies, and lung diseases such as asthma can damage the sleep cycle and cause sleep that is not refreshing. In puberty, kids often experience more anxiety, depression, and eating disorders, and these conditions may affect sleep as well.

Electronics

Exposure to electronic devices right before bedtime, including televisions or smartphones, decreases the quality of sleep and leads to excessive sleepiness during the day. The use of screens can postpone bedtime, and the light emitted by electronic devices disrupts melatonin secretion. The result is shorter and lower-quality sleep.

Work, Entertainment, and Studies

Adolescents are busy! Going to a part-time job, being active in youth groups or sports, spending time with friends, doing homework, and studying for tests can shorten sleeping hours and contribute to a feeling of stress. Stress can further harm the quality of sleep.

Stimulants and Medications

Caffeine, found in coffee, chocolate, tea, and energy drinks, has a stimulating effect on the body, and it may disrupt sleep and cause excessive sleepiness during the day. It is recommended that caffeinated drinks should not be consumed at least 6 h before bedtime.

Many medications also cause sleep problems and excessive daytime sleepiness. These include prescription and over-the-counter stimulants such as ADHD drugs, drugs for the treatment of certain diseases such as epilepsy, allergy drugs, painkillers, and more. Taking medication at the correct time can improve sleep.

WHAT HAPPENS WHEN WE DO NOT SLEEP ENOUGH?

Could it be okay to not sleep? After all, we could "waste" less time if we did other things instead of sleeping. Let us examine how lack of sleep may affect our bodies (Figure 3) [1, 4].

Mood and Behavior

An insufficient amount of sleep is linked to an increase in sleepiness and feelings of tiredness during the day, sharp mood swings, symptoms of anxiety and depression, and an increased frequency of suicidal thoughts. Irregular sleeping hours and lack of sleep are linked to an increase in risky behaviors such as drinking alcohol, smoking cigarettes, and using drugs. These behaviors, in turn, may further harm the timing and quality of sleep. Daytime sleepiness can lead to car accidents, work accidents, and sports injuries.

Figure 3

Be aware of symptoms of sleep deprivation! Symptoms include: feeling tired during the day, mood swings, weight gain, lack of concentration, and frequent illnesses (which also increases absences from school) [Image credit: taken from a post uploaded to the Facebook page of the Indian oil and natural gas corporation, Hindustan Petroleum, on World Sleep Day 2023].



Figure 3

Cognitive Functioning and Academic Performance

Adolescents who suffer from a lack of sleep report a decrease in cognitive functioning and can have difficulty concentrating at school, resulting in decreased academic performance. Sleep deprivation is so common in children that some are diagnosed with attention deficit disorder even though the real problem is a lack of sleep. Lack of sleep can be reflected in poor grades, increased absences, and difficulty concentrating in class. These are just *some* of the negative side effects of an insufficient amount of sleep on the brain.

Obesity

As with adults, lack of sleep among children and adolescents is linked to **obesity**. When the body is in a state of sleep deprivation, there are hormonal changes and changes to the body's metabolism. These changes can make people feel hungrier than normal. So, the less you sleep, the hungrier you are, and the more you eat. Obesity is often associated with a collection of symptoms including a fatty liver and high blood pressure, and it can increase the risk of developing diabetes and heart disease.

DOES STARTING SCHOOL LATER HELP?

There have been many studies on delaying school start times, to see if such delays might help prevent lack of sleep among children and adolescents. A growing number of schools all over the world are implementing late-start programs to adapt the school day to the delayed circadian rhythm of adolescents and teenagers. Many U.S. states have passed laws requiring that classes in middle and high

OBESITY

A medical condition sometimes considered a disease, in which excess body fat has accumulated to such an extent that it can potentially have negative effects on health.

schools may not begin before 8:30 am [5]. Adolescents in these states reported sleeping for more hours. More importantly, their improved sleep helped with some of the negative effects of sleep deprivation, including increased positive mood, reduction in school absences, weight loss, reduced intake of caffeine, better grades, and even fewer traffic accidents involving teenagers [1, 5]. Changing school hours is challenging, though, so not all areas can do this. We also still do not know exactly how long the start of the school day should be delayed to gain the positive effect.

CONCLUSION AND RECOMMENDATIONS

Will we soon see schools everywhere implement a later start time? Maybe, but in the meantime, each and every one of you needs to take care of your personal sleep hours. Remember: even an extra hour of sleep at night can work like magic—your mood could improve, your grades might go up, and you will probably feel refreshed and healthier.

So, to improve your sleep, remember: stop using screens about 2 h before bed (try reading a book instead), avoid caffeinated beverages after 4 pm, get some exercise during the day—go for a run or a swim, and, if you are still having trouble sleeping, talk to your parents or doctor.

Finally, here are some tips to help you overcome jet lag on your next vacation: A few days before the flight adjust your bedtime to the new clock, go to bed slightly later than usual (for a westbound flight), or a bit earlier (for an eastbound one). Upon your arrival at the new destination, spend time outside in the daylight.

Good night and sleep tight!

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YOUNG REVIEWERS

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I study in an honors class at Haim Guri School in Netanya. In the afternoons I like to do art, swim, and sometimes run. In addition, I play the piano and music is a big part of my life. I also love traveling and discovering new places.



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I study in a cyber class at the ORT Gutman School in Netanya. I train in track-and-field and compete in sprint and long jump.



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Dr. Alex Gileles-Hillel is a pediatrician specializing in pulmonary (lung) and sleep disorders at Hadassah University Medical Center, Jerusalem and he is also a senior lecturer at the Faculty of Medicine at the Hebrew University of Jerusalem. Alex studies sleep disorders in a variety of contexts—in his lab, he uses cells and mice to examine how breathing disorders during sleep damage the body's systems. In the clinic, he treats children and adults coping with breathing and sleep disorders and researches what can be done to help them. At home, he strictly observes the tradition of a Friday afternoon nap. *agileles@gmail.com



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Leila is a sixth-year medical student at the Hebrew University of Jerusalem. She is studying in the Tzameret IDF track and will soon become a doctor in the army. Her research, supervised by Dr. Alex Gileles-Hillel, focuses on sleep disorders in children. Leila loves to travel around the world and has already visited 29 countries, including China, Iceland, and Morocco. She used to be an athlete in the field of synchronized swimming and still follows the sport closely.