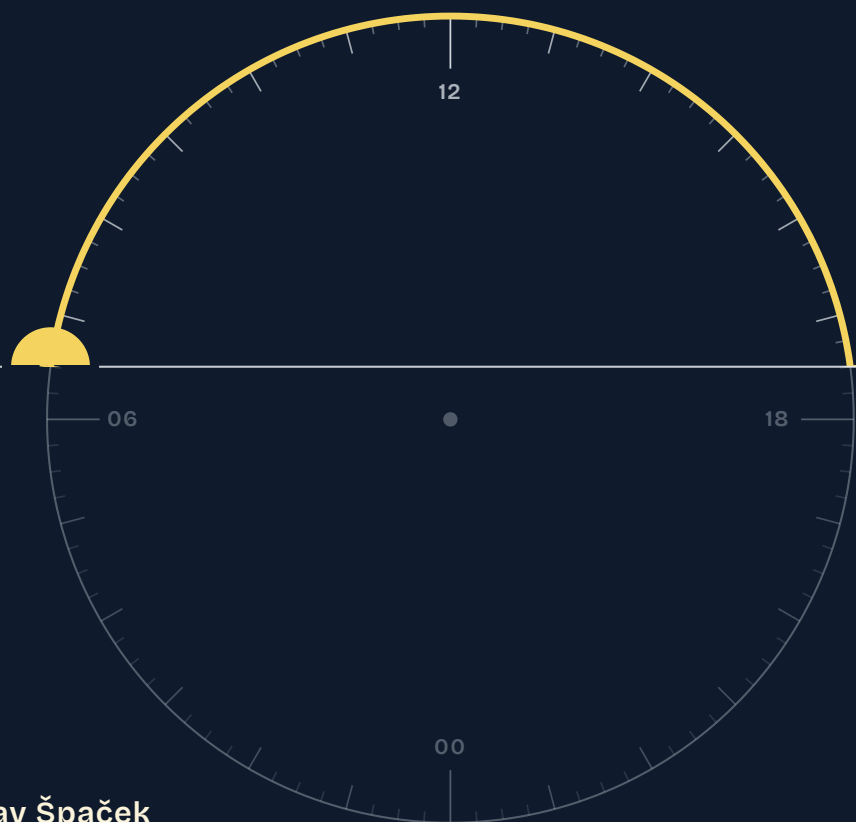


Rested

*The science of sleep and daily energy, and
what to do with it*



Miroslav Špaček

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Miroslav Špaček

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Medical disclaimer

This book offers general information about sleep and daytime energy. It is not medical advice and does not replace diagnosis or treatment by a doctor or another qualified health professional.

Talk to a qualified professional about symptoms that worry you, and before you start a supplement, change a treatment or stop a medication. In an emergency, call your local emergency number or go to the nearest emergency department straight away.

The information reflects the research available at the time of writing. Research changes, and the author accepts no liability for decisions made on the basis of this book.

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How to read this book

This book sets out what is known about sleep and daytime energy, how well it is known, and what you can reasonably do with it. Factual statements are tied to numbered sources at the back; when several sentences report the same study, the number comes once, at the end. A sentence without a number is my own reasoning or arithmetic, or a plain instruction.

The three evidence grades

Each time the book recommends something, a box headed “Evidence” gives a verdict and a grade, shown as three dots: three filled for strong, two for moderate, one for limited. The grade describes the evidence behind that particular piece of advice, not the topic as a whole. When the biology is solid but the advice built on it has not been tested in everyday life, the box takes the lower grade and says why.

Strong means consistent results from several good randomized trials or meta-analyses, or a consensus at the level of clinical guidelines. Strong does not mean large. Cognitive behavioral therapy for insomnia (CBT-I) is the first-line treatment for chronic insomnia in American and European guidelines^{1,2}, yet in a meta-analysis of 20 trials it shortened the time to fall asleep by about 19 minutes and barely changed total sleep time³.

Moderate means support from at least one good meta-analysis or several consistent studies, but with real limits: small samples, short follow-up, mixed results, or mostly lab conditions.

Limited means few or small studies, observational data only, animal work, or a reasonable inference from mechanisms that has not

been tested directly. In some places the answer is “we don’t know”, and the book says so.

Why the numbers come with a population

A result applies first to the people who were studied. The finding that two weeks of 6-hour nights steadily erode attention, for example, comes from a lab study of healthy adults aged 21 to 38, 13 of whom were put on that schedule⁴. It probably holds for a 55-year-old parent at home, but that is an inference, so numbers here come with who was measured and how.

Reading the numbers

“Four times the odds” or “1.3 times the risk” compares two groups. Whether a study reports an odds ratio, a relative risk or a hazard ratio, a value of 1 means no difference and 1.3 means 30% higher. A standardized effect size (written *d* or *g*) expresses a difference in units of how much people vary; by a common rule of thumb, about 0.2 is small, 0.5 medium and 0.8 large. And percentage points differ from percent. If deep sleep falls from 20% of the night to 18%, that is a drop of 2 percentage points, or 10%.

Correlation and cause

Many sleep findings come from following large groups of people over years, which shows patterns but rarely proves cause. People who report sleeping very long hours die earlier on average than people who sleep about 7 hours, but the researchers who pooled those studies point out that long sleep may be a marker of illness already present rather than its cause⁵. The book calls an association an association.

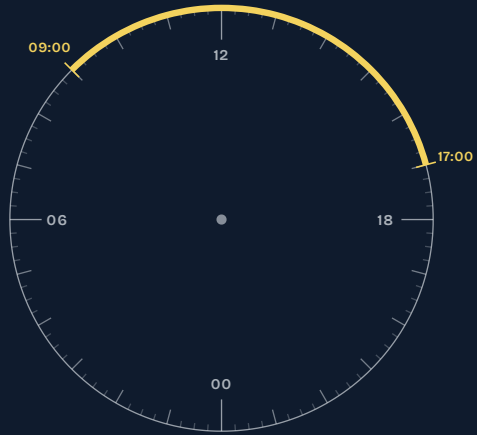
What this book is not

This is general information about sleep, written for adults. It is not medical advice, and it cannot diagnose you. Boxes headed “See a doctor if...” list warning signs, and the book gives no doses for any medicine or supplement. If you have a diagnosed sleep disorder, are pregnant, work in a safety-critical job, or take medicines that affect sleep or alertness, talk to your doctor before changing how you sleep. Chapter 8 lists who should not try its strongest technique without a clinician.

How the chapters fit together

The introduction separates sleepiness from fatigue. Chapters 1 to 4 explain how sleep works and what goes wrong without enough; 5 to 7 cover the levers you control, such as light, caffeine and exercise; 8 and 9 deal with insomnia, shift work and jet lag; 10 covers energy across the day; and 11 turns it all into a four-week plan.

Boxes headed “Try this” give steps you can test on yourself. If you are short on time, do the two-question check at the end of the introduction, then read chapters 3, 5 and 11; add chapter 8 if your problem is lying awake, and chapter 10 if it is daytime fatigue. Times use a 24-hour clock, so 23:00 means eleven at night.



Introduction

Tired is not one thing

Sleepiness and fatigue feel alike from the inside, but they can have different causes and often respond to different fixes.

In a study of 283 patients at a sleep clinic, researchers gave everyone two questionnaires, one measuring fatigue and one measuring sleepiness. If those were the same thing, the scores would have risen and fallen together. They barely did: the correlation was 0.18, which is weak. In all, 64% of the patients reported fatigue severe enough to count as abnormal without being abnormally sleepy, and only 4% had the reverse, sleepiness without fatigue. The patients with prominent fatigue also tended to have depressive symptoms⁶.

These were people already referred for sleep problems, so the percentages say little about the general population. Yet most of us use one word, “tired”, for both states.

Many readers will already have tried the usual tips. This book grades each recommendation by the quality of the evidence behind it, and some popular ones grade poorly. A Cochrane review could not say whether blue-light-filtering glasses improve sleep, because the evidence was of very low certainty⁷. In a trial of 167 young iPhone users, the phone’s Night Shift setting made no measurable difference to sleep⁸. Sleep hygiene on its own is not recommended as a treatment for chronic insomnia⁹; the treatment that guidelines do put first, cognitive behavioral therapy for insomnia (CBT-I), is the subject of chapter 8.

Two different complaints

Sleep medicine has a fairly tight definition of daytime sleepiness. In a draft of its diagnostic manual, the American Academy of Sleep Medicine (AASM) describes it as an inability to stay awake and alert during the main waking part of the day, with episodes of an irrepressible need for sleep or unintended lapses into drowsiness. It shows up most in sedentary, boring, monotonous situations¹⁰. Sleepiness is about how easily sleep would take you if you let it. A long meeting in a warm room after lunch tests it; a heated argument does not.

Fatigue is harder to pin down. It describes low energy or a lack of drive to get going, and it can be present when you would not fall

asleep if you tried. A review of the two concepts found that they are often used interchangeably or merged under the everyday word “tired”, that sleepiness can be defined only by how it is measured, and that fatigue has no gold-standard measure and is still assessed by asking people how they feel¹¹.

The same draft offers a clear contrast. It describes chronic fatigue syndrome as fatigue that persists or keeps coming back and does not resolve with sleep or rest. People with the condition complain of fatigue rather than sleepiness, and on the Multiple Sleep Latency Test, a daytime lab test of how quickly a person falls asleep, their results are normal¹⁰.

Sleepiness and fatigue often travel together, and plenty of people have both. When they come apart, an earlier night helps one and may barely touch the other.

Why the difference decides what helps

If your main problem is sleepiness, the levers are the ones this book spends most of its pages on: how much you sleep, when you sleep, and what disturbs your sleep. Chapters 3 to 9 cover them, and chapter 2 explains how sleep pressure and the body clock combine.

If your main problem is fatigue without much sleepiness, extra hours in bed may change little. Fatigue has a wider set of possible sources, including low mood, stress and physical illness¹². Sleep can still play a part, but it may not be the main part.

Sleepiness is also hard to judge from the inside. In a lab study of healthy adults aged 21 to 38, the 26 participants kept to 4 or 6 hours in bed per night for 14 days grew steadily worse on a simple attention test, while their own ratings of sleepiness rose a little in the first days and then barely changed⁴. The researchers concluded that the participants were largely unaware of their growing deficits. “I don’t feel sleepy” is weak evidence that you are well rested; chapter 4 shows why.

Measuring sleepiness: the Epworth scale

A standard questionnaire for daytime sleepiness is the Epworth Sleepiness Scale. It asks how likely you are to doze off in eight ordinary situations, and the answers add up to a total out of 24. In the original study of 180 adults, 30 healthy controls and 150 patients with sleep disorders, the scale separated the patients from the controls, and the scores tracked how fast people fell asleep on the Multiple Sleep Latency Test¹³. The questionnaire is copyrighted and is not reproduced here.

In a later survey of day workers at an Australian company, people without signs of a sleep disorder scored between 0 and 10, with an average of 4.6. Patients with narcolepsy or a related condition scored 12 to 24. Scores above 10 were taken to indicate excessive daytime sleepiness, and 10.9% of the workers scored above 10¹⁴.

The scale has limits. A systematic review of 35 studies found that its eight items hang together well (good internal consistency), but its scores correlated only moderately or weakly with objective tests of sleepiness. The authors recommended it for comparing groups rather than for judging individuals¹⁵.

Evidence ●●○ Moderate

A high Epworth score, or falling asleep where you clearly should not, such as mid-conversation, is a reasonable trigger for a medical visit. If you have dozed off, or nearly dozed off, while driving, do not drive while drowsy until you have been seen; chapter 4 explains why. The cut-off of 10 comes from one well-described workplace survey, and the scale works better as a screen for groups than as a measurement of one person, so treat a high score as a prompt to ask, not as an answer.

When tiredness is a medical symptom

Fatigue is among the ten most common reasons people see a family doctor, according to a US clinical review¹⁶. In primary care, a hidden cancer turns out to be rare, but a real share of persistent fatigue

has a cause a doctor can find and treat, such as a sleep disorder, depression or anemia¹². Chapter 10 goes through these causes and how often each turns up.

The UK's National Health Service advises seeing a doctor if you have felt tired for a few weeks without knowing why, if tiredness is affecting your daily life, if it comes with other symptoms such as weight loss or changes in mood, or if someone has noticed you gasping, snorting or choking in your sleep. Among the medical causes it names are iron deficiency anemia, sleep apnea, diabetes, an overactive thyroid, and illnesses such as glandular fever (mononucleosis) and COVID-19¹⁷.

One group needs a specific warning early in the book. In myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS), the key symptom is post-exertional malaise, a worsening of symptoms after exertion. Exercise can be harmful because it can trigger that worsening, and patients are advised to pace themselves, keeping activity within the energy they have¹⁶. Many people with long COVID have similar symptoms. Several chapters of this book suggest more activity. If exertion reliably makes your symptoms worse afterward, that advice is not for you until you have talked to a doctor. Chapter 10 has the full list of warning signs.

What this book covers and what it doesn't

This is a book about ordinary sleep and ordinary tiredness in adults. It explains how sleep works, how much of it people need, what shortens or disturbs it, and which changes have good evidence behind them. It covers insomnia in depth, because insomnia is common (chapter 8 gives the figures) and because its first-line treatment includes steps you can begin yourself.

It is not a manual of sleep disorders. Sleep apnea, restless legs syndrome and narcolepsy appear as warning signs, with enough detail to recognize when to get help, but their diagnosis and treatment belong to clinicians. Children and teenagers appear only in

passing. Shift work and jet lag get a chapter of their own, but most of the advice assumes a fairly regular daytime schedule.

What to do with this

Before changing anything, it helps to know which kind of tired you are dealing with. The questions below take a week and cost nothing.

Try this

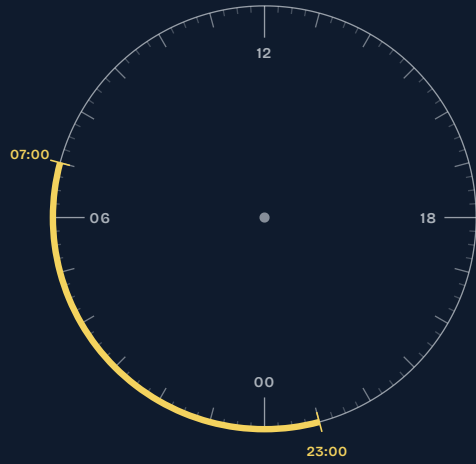
For seven days, each time you notice you feel tired, ask yourself two questions and write the answers down. First: if I sat in a quiet, warm room right now, would I fall asleep within a few minutes? Second: would a short nap fix how I feel? Mostly yes to both points toward sleepiness, and the chapters on sleep amount, timing and light are the place to start. Mostly no points toward fatigue, which makes the medical questions in this introduction and in chapter 10 more relevant. Mixed answers are common, because many people have both. Two patterns call for a doctor before any self-help: heavy sleepiness even though you regularly give yourself 7 or more hours in bed, and gasping, snorting or choking in your sleep that someone else has noticed^{17,18}.

Evidence ●○○ Limited

Sleep medicine treats sleepiness and fatigue as separate states, and in one clinical sample they barely correlated. The two-question check applies that distinction, but nobody has tested it as a tool. Use it to orient yourself; it cannot rule anything out.

Key points

- “Tired” covers two states: sleepiness and fatigue.
- They often occur together but can come apart.
- Feeling alert is weak evidence that you are well rested.
- A high Epworth score is a reason to see a doctor, not a diagnosis.
- Fatigue that lasts weeks or comes with other symptoms deserves a medical look.



1

What happens when you sleep

A night of sleep has a predictable shape, and knowing it makes many common worries about sleep smaller.

In a sleep lab, a night is cut into pages 30 seconds long. Electrodes record brain waves, eye movements and the muscle tone of the chin, and a trained scorer looks at each 30-second page and gives it a label: awake, one of three stages of non-REM sleep, or REM (rapid eye movement) sleep. These rules come from the American Academy of Sleep Medicine (AASM), whose task force kept the 30-second page, set the recording sites, and renamed the stages in 2007¹⁹. Almost everything known about the inside of a night, including what follows in this chapter, rests on this kind of page-by-page labeling.

Stages are labels on a continuous signal

Falling asleep has a recognizable signature. When you lie relaxed with your eyes closed, the back of your brain produces a steady alpha rhythm of 8 to 13 waves per second. The AASM task force judged the fading of that rhythm the most valid electrical marker that sleep has begun^{19,20}.

The first stage, N1, is a short transition. The brain waves become small and mixed, and in the first cycle of the night this stage usually lasts 1 to 7 minutes. Noise easily ends it²⁰. N2 follows. It is marked by sleep spindles, brief bursts of faster activity that wax and wane, and by K-complexes, single large waves, at least half a second long, with a sharp swing one way followed by a swing the other. N2 is the ordinary middle of sleep and takes up roughly half the night in adults^{20,21}.

N3, also called slow-wave sleep, is what this book calls deep sleep. It is defined by large, slow waves: fewer than two per second and above a set height on the recording. It is the hardest stage to wake someone from^{20,22}. In deep sleep, large populations of brain cells switch between active and quiet phases in unison, which is why the trace swells into big, slow waves²¹.

REM sleep looks almost the opposite. The brain waves resemble those of a waking brain, the eyes dart in bursts, and most muscles

lose their tone²⁰. That muscle shutdown likely keeps people from acting out their dreams²⁰.

Older studies used a different rulebook from 1968, in which deep sleep was split into stages 3 and 4. The 2007 rules merged them into N3 because there was no evidence to justify keeping them apart¹⁹. The two systems give different numbers from the same recordings, which matters later in this chapter. Using the current rules, pooled data from healthy adults of all ages put N1 at 7.9% of total sleep, N2 at 51.4%, N3 at 20.4% and REM at 19.0%²³.

These stages are human categories laid over a signal that changes smoothly. In a test involving more than 2,500 scorers and over 3.2 million scoring decisions, scorers matched the score chosen by the majority 82.6% of the time on average. Agreement was highest for REM, 67.4% for N3 and 63.0% for N1, and telling N2 from N3 was especially hard²⁴.

Consumer sleep trackers add errors of their own. In a lab comparison of seven consumer devices, four wearables and three non-wearable devices, tested on 34 healthy young adults, the devices detected sleep well but missed much of the time people lay awake. Their stage estimates were inconsistent: all three non-wearables overestimated deep sleep, and three devices underestimated REM²⁵. The devices were models on sale before the study appeared in 2020, and newer ones may differ. Chapter 8 returns to trackers.

The shape of a night

Sleep runs in cycles of non-REM followed by REM. The first cycle is usually 70 to 100 minutes long and later cycles about 90 to 120 minutes²⁰. A large recent dataset comes from Basel, where researchers pooled recordings of 369 healthy people sleeping 8 hours in the lab at their usual bedtime, covering 6,064 cycles. The median cycle lasted 96 minutes, but cycle lengths varied a lot and were not evenly spread around that median, and the first cycle was consistently shorter than the later ones. Older participants had longer non-REM and shorter REM episodes, women had longer

non-REM episodes, and after sleep deprivation the first non-REM episode was longer. Moderate light before bed and noise during the night did not change cycle length significantly²⁶.

Most people go through four or five cycles in a night, though textbook counts vary²⁷, and the cycles are not copies of each other. Deep sleep dominates the first third of the night and then shrinks. REM periods start short, sometimes only 1 to 5 minutes in the first cycle, and grow longer toward morning; the longest come in the last third of the night^{20,21}. Think of a staircase you walk down and back up four or five times. Early in the night the stairs go all the way to the bottom. Toward morning you turn around higher up and spend longer on the REM landing.

Figure 1.1 shows this shape for a typical young adult in bed from 23:00 to 07:00. It is a constructed illustration that fits the published ranges, not one person's recording.

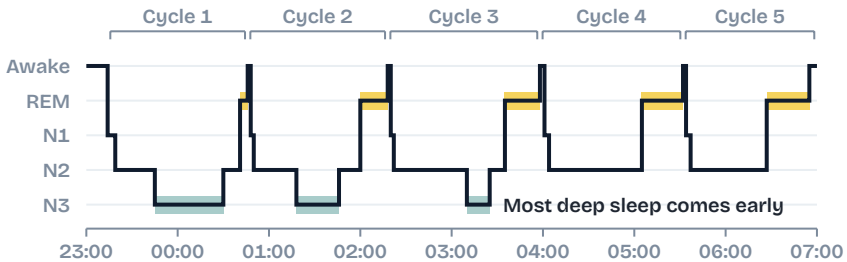


Figure 1.1 A typical night for a young adult, 23:00 to 07:00. Deep sleep (N3) is concentrated in the first cycles, REM periods get longer toward morning, and brief awakenings between cycles are normal. A constructed illustration, not one person's recording.

Schematic, based on Colten & Altevogt 2006, Cajochen et al. 2024, Rasch & Born 2013 and Boulou et al. 2019^{20,21,23,26}.

How deep that first stretch of sleep goes depends partly on how long you have been awake. In a small study of 9 people kept up for 36 hours, slow-wave activity (a measure of how strong the slow waves are) in their recovery sleep started out above normal and then settled back to stable levels later in the night²². This link

between time awake and deep sleep is the core of sleep pressure, the process chapter 2 calls Process S.

One practical consequence is that apps and calculators that time your alarm in exact 90-minute blocks assume a precision that the data do not show. “About 90 minutes” is a fair average. Exact arithmetic for any particular night is not supported.

Waking up in the night is part of normal sleep

Healthy sleepers wake many times a night, and most of those awakenings are brief. In a lab study of 76 people aged 18 to 70 who had no sleep complaints and had been screened for sleep apnea and limb movements, the average number of scored awakenings on their first night in the lab rose from 21.5 in 18-to-20-year-olds to 43.3 in people in their fifties and 42 in their sixties. Briefer disturbances, called arousals, were more frequent still: from about 11 per hour of sleep in the youngest groups to about 22 per hour in the oldest²⁸. The authors describe brief arousals as an integral part of sleep.

Pooled data from many labs agree. Healthy adults aged 18 to 34 spend an average of about 32 minutes awake after first falling asleep²³.

A separate small study suggests why some of these awakenings may leave no trace in memory. Thirty students heard a stream of sounds and spoken material as they fell asleep. When they were woken after 10 minutes of sleep, they could recall almost nothing of what they had heard in the last 4 minutes before sleep began; after only 30 seconds of sleep, recall was not impaired²⁹. That may help explain why many short awakenings vanish from memory, though the study did not test night awakenings directly.

Waking at night becomes more common with age, as the next section shows. What matters clinically is long stretches of wakefulness or problems during the day, which chapter 8 covers.

How sleep changes with age

Two large meta-analyses of age and sleep used different scoring rules. The older one pooled 65 studies of 3,577 healthy people aged 5 to 102, almost all scored with the 1968 rules. Across adult life, total sleep fell about 10 minutes per decade, time awake after falling asleep rose about 10 minutes per decade from age 30, and sleep efficiency (the share of time in bed spent asleep) fell about 3 points per decade, mainly from age 40. After about 60, most measures stopped changing, and only sleep efficiency kept falling³⁰. The age trends also differed depending on whether studies had screened out people with illness, mental disorders or sleep disorders such as apnea³⁰.

The newer meta-analysis pooled 169 studies of 5,273 healthy adults scored with the 2007 rules. It found almost the same losses per decade: 10.1 minutes of total sleep, 2.1 points of sleep efficiency, and 9.7 more minutes awake after sleep onset. But it found no significant change in the share of N3 with age²³. N3 made up 21.4% of sleep in study groups whose average age was 18 to 34, 18.1% in groups averaging 50 to 64 and 19.9% in groups averaging 65 to 79. Figure 1.2 shows these values.

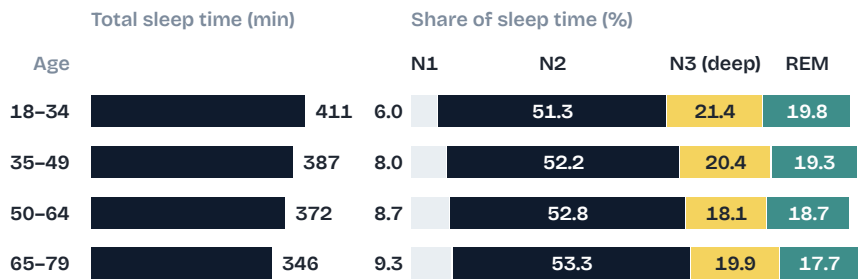


Figure 1.2 Pooled lab recordings of healthy adults, grouped by the average age of each study’s participants. Total sleep time falls with age; the share of deep sleep (N3), scored under current rules, barely changes. The group aged 80 and over (a single study) is not shown.

Data: Boulos et al. 2019, meta-analysis of 169 studies (5,273 healthy adults), AASM scoring, lab polysomnography²³.

On deep sleep, the two eras disagree. Under the 1968 rules, the older meta-analysis found deep sleep falling about 2 percentage points per decade³⁰, and a pooled study of 149 healthy men found it dropping from 18.9% of the night at ages 16 to 25 to 3.4% at ages 36 to 50³¹. Under the 2007 rules, the newer meta-analysis found no significant change.

What is not in doubt is that the slow waves themselves shrink with age. They become smaller and fewer, especially over the front of the brain and in the first one or two cycles, and the decline is already visible in middle age³². How much of that shows up as lost “stage N3” depends on the rulebook. N3 is scored when slow waves pass a fixed height that the current rules chose not to adjust for age^{19,22}, and the current rules score more N3 than the old ones on identical recordings, about 9 minutes more per night³³. None of the studies reviewed for this book works out how these pieces combine, so treat any single deep-sleep percentage for older adults as rough.

Averages also hide wide differences. At the same age, some older adults show little disruption of sleep and others a great deal^{22,32}. Whether older adults need less sleep, or simply become less able to produce it, is still debated³². Chapter 3 takes up that question.

What the stages appear to do

Sleep’s functions are harder to study than its structure, and the evidence varies widely in quality. Here it is sorted roughly from best supported to least.

Memory has the strongest case. A meta-analysis of 271 independent samples from studies published between 1967 and 2019 found that sleeping after learning improved later recall of facts and events compared with staying awake. The overall effect was moderate in size (a standardized effect of 0.44), and after adjusting for the possibility that unimpressive studies went unpublished, it shrank by more than a third, to 0.28, but stayed significant. The benefit was largest for free recall and smallest for recognition, and larger after night sleep than after daytime naps³⁴. The leading explanation is

that memories first held in the hippocampus, a structure deep in the brain that holds new memories for a while, are replayed during deep sleep and gradually transferred to the cortex, the brain's outer layer, with slow waves, spindles and faster bursts in the hippocampus timing the transfer²¹. That model is well regarded, but much of its mechanism comes from animal recordings.

The popular split of “deep sleep for facts, REM for skills” is too simple. Much of its support comes from studies comparing the first half of the night, rich in deep sleep, with the second, rich in REM²¹. In humans, selectively depriving people of REM mostly failed to impair memory, and antidepressants that suppress REM produce no obvious memory problems²¹. The “skills” half has weakened too: a meta-analysis of 1,296 participants learning typed finger sequences found no evidence that sleep improves the skill once measurement artifacts, fatigue during training and time of testing were accounted for, only inconsistent evidence that sleep stabilizes it³⁵. Several other well-known findings have failed to replicate or held only under certain conditions³⁶.

Deep sleep also matters for the body. In a classic study of 8 young adults, 7 showed their main nightly pulse of growth hormone at the onset of deep sleep, and delaying sleep delayed the pulse³⁷. In the 149 men mentioned above, growth hormone secretion fell alongside deep sleep across age and was linked to deep sleep independently of age³¹. A direct test comes from a study of 9 healthy young adults whose deep sleep was suppressed with sounds for three nights, without changing their total sleep. Their insulin sensitivity fell by about 25%, and the more deep sleep they lost, the larger the drop³⁸. The study is small and short, but it is an experiment, and it suggests that deep sleep has a role in regulating blood sugar.

Ideas still being argued over

The best known is that sleep washes waste out of the brain. In live mice, sleep widened the space between brain cells by about 60% and cleared an injected Alzheimer's-related protein twice as fast as

wakefulness³⁹. In that study, though, the sleeping mice were recorded at midday and the awake mice in the evening. A 2024 mouse study using a different method found the opposite: clearance was markedly lower during sleep and anesthesia⁴⁰. The original group argues that the new study measured dye moving around inside the brain rather than leaving it, and the authors of the new study reject that critique^{41,42}.

The human evidence is small and indirect. During non-REM sleep, slow brain waves are followed by large waves of cerebrospinal fluid, the clear liquid that bathes the brain and spinal cord⁴³, which shows fluid moving but says nothing directly about waste leaving. In a small study of 24 people, one night without sleep slowed the clearance of an injected tracer⁴⁴. In 20 healthy adults, one sleepless night raised the amount of the same Alzheimer's-related protein in two brain regions⁴⁵. On this book's scale the evidence is limited: an unresolved hypothesis built mainly on mouse work. No sleep habit has been shown to "detox" the human brain.

A second idea, the synaptic homeostasis hypothesis, proposes that learning during the day strengthens connections between brain cells overall, and that sleep scales them back down while keeping the most important changes⁴⁶. Its best direct evidence is in mice: an electron-microscope study of 6,920 connections found their contact surfaces about 18% smaller after sleep than after wake, with the largest connections spared⁴⁷. That work comes from the hypothesis's originators, and a critical review concluded that the mechanism is unclear and the function unproven⁴⁸. It competes with, and may partly fit alongside, the memory-replay model.

A third idea holds that REM sleep softens emotional memories. In a study of 34 young adults, a night of sleep reduced brain and emotional reactions to previously seen upsetting pictures⁴⁹. In a study of 106 young adults, sleep preserved emotional reactions instead⁵⁰. Meta-analyses have found no consistent effect of sleep on emotional reactivity and no general advantage for emotional over neutral memories⁵¹⁻⁵³.

Dreams, finally, are not confined to REM. About 80% of vivid dream recall follows waking from REM²⁰, but across studies about half of awakenings from non-REM sleep also produce reports of some mental content⁵⁴. What dreams are for, we don't know.

What to do with this

A night with several awakenings can still be a normal night, and a tracker's deep-sleep number is a weak basis for worry. Deep sleep matters, but healthy young adults vary widely in how much they get, from 10% to 25% of the night²², and trained scorers matched the majority verdict on deep-sleep pages only about two-thirds of the time²⁴.

Evidence ●●○ Moderate

Brief awakenings are normal. Healthy adults without sleep complaints wake briefly 20 to 40 or more times a night, and young adults average about half an hour awake after falling asleep in lab studies. The pooled norms are strong; the age-by-age counts come from one lab. Long stretches awake, or problems during the day, are what deserve attention (chapter 8).

Evidence ●●○ Moderate

Do not chase a deep-sleep score, and use trackers for timing rather than depth. Deep sleep has real functions, including a role in blood-sugar control, but it is one stage among several and varies widely between healthy people. Consumer devices detect sleep reasonably well, miss quiet wakefulness and estimate stages unreliably, and the devices tested so far may not represent newer models.

Try this

If you use a sleep tracker, spend two weeks looking only at when you went to bed and when you got up, and ignore the stage breakdown. If checking the score makes you anxious, stop wearing the device at night for that time. Trackers are more useful for timing and rough duration than for depth²⁵, the AASM says they cannot be used to diagnose or treat sleep disorders⁵⁵, and chasing perfect numbers can itself feed worry about sleep⁵⁶.

Key points

- A night runs in cycles of about 90 minutes, with deep sleep early and REM late.
- Waking briefly many times a night is normal.
- How much deep sleep declines with age depends partly on the scoring rules.
- Sleep helps memory moderately; claims about brain “washing” are unproven.
- Tracker sleep stages are unreliable; use trackers for timing.

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