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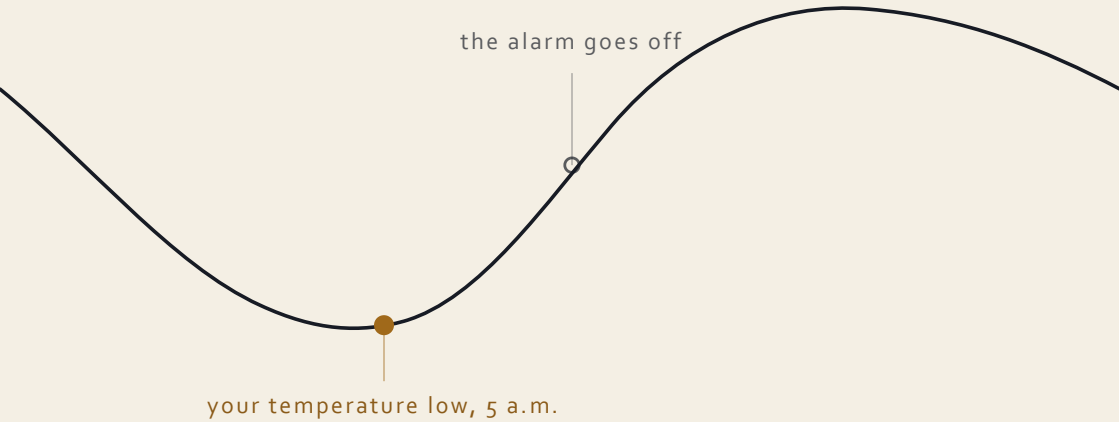

How to Never Wake Up Tired Again

Sleep, light and energy:
the complete 21-day method

How to Never Wake Up Tired Again

Sleep, light and energy: the complete 21-day method

Published by Dealvo. First edition.

Important. This book is general information. It is not a diagnosis, not a treatment, and not personal medical advice, and it does not replace seeing a doctor. Sleep disorders need medical care. If you are persistently exhausted, if you snore with pauses in your breathing, if you fall asleep without meaning to during the day, or if your tiredness comes with lasting low mood, see a doctor first.

If you have fallen asleep at the wheel, or come close to it, stop driving and see a doctor before you do anything else in this book.

On sources. Every factual claim here carries a numbered reference, listed by chapter at the back. Every reference is labelled with its level of evidence. Where studies disagree, or rest on small numbers, the text says so as it goes. Nothing has been cited without being checked at the source.

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PREFACE

What this book is, and what it refuses to do

There is a version of this book that would sell more copies. It is not the one you are holding.

Almost everything written for the general public about waking up tired is built the same way. It picks a villain, promises a fix, and quietly leaves out the studies that did not cooperate. It is a comfortable formula, and it is why you have probably read three of these books already and still feel the way you feel at 6.30 in the morning.

This book is built the other way round. It began as an attempt to answer one question honestly: when someone sleeps a normal number of hours and still wakes up feeling destroyed, what is actually going on? Following that question properly meant reading the research rather than the summaries of the research, and it meant accepting the answers even when they were inconvenient.

Several of them were.

Three promises

Every claim is sourced, and every source is graded

You will find a small number beside factual statements in this book. It leads to a full reference at the back, with authors, year, journal and identifier, and with a label telling you what kind of study it was. A meta-analysis that pools dozens of trials is not the same as a laboratory experiment on eight people, and you deserve to know which one is holding up the sentence you just read.

This matters more than it sounds. A great deal of popular sleep advice traces back, when you follow the chain, to a two-page research letter, a conference abstract from 1988, or a university press release. Some of it does not trace back to anything at all.

When the evidence is thin, the book says so

There are places in these pages where the honest answer is that nobody knows yet, or that two good studies disagree. You will read sentences like *the evidence here rests on twelve people*, and *the best-designed study of this found nothing*. That is not hedging. A book that never admits uncertainty is a book that has stopped checking.

It will tell you when the answer is not in this book

Waking up exhausted is sometimes a lifestyle problem, and this book can help with that. It is also, often, a symptom. Sleep apnoea, iron deficiency, thyroid disease and depression all present exactly this way, and none of them is fixed by a better morning routine.

The commercial instinct of a book like this one is to imply that you can sort it out yourself. On this subject that instinct is a hazard, because it is the mechanism by which someone spends six months on a sleep protocol while an untreated condition carries on. Chapter four exists to interrupt that, and it is the most important chapter in the book.

How to read this

The book has five parts and they build on each other, but people arrive with different needs, so here is the map.

IF YOU ARE IN A HURRY

1. Read chapter 4 first. It sorts out which of the six causes is yours, and whether you should be seeing a doctor rather than following a protocol.
2. Then go straight to Part V, the 21-day method, and start.
3. Come back to Parts I to IV when you want to know why any of it works.

If you are not in a hurry, read it in order. Part I explains why you feel the way you do, which turns out to be the part most people find genuinely relieving. Part II is about light, which is the single most underused lever available to you. Part III covers the four other levers, ranked by how much they actually matter rather than by how often they are mentioned. Part IV makes the method yours rather than generic. Part V is the three weeks.

A word about the lamp

This book was published by a company that sells a sunrise lamp, and you would be right to hold that against it until it earns otherwise. So let me be direct about what the research says, including the part that is bad for the product.

A bedside sunrise lamp does not reset your body clock. The physics prevents it: a closed eyelid transmits roughly three parts in a thousand of blue light, and the best-controlled trials of dawn simulation have looked for a shift in circadian timing and failed to

find one. Anyone selling you a lamp on that basis is overstating it, and you will find the studies laid out in chapter six rather than buried.

What a dawn signal does do, and this is well supported, is make waking easier, less unpleasant and less foggy. That matters more than it sounds, because the thing that genuinely moves your body clock is real daylight, and the reason most people never get any is that they cannot face being upright early enough to go and find it.

PART I · WHY YOU WAKE UP TIRED

1

The morning you know too well

You slept seven hours. You feel as though you slept four. This chapter explains why that is neither imaginary nor your fault.

It is 6.30 in the morning. Somewhere near your head a sound goes off. You did not dream it and you did not see it coming. It did not exist a second ago, and now it fills the whole room.

Your arm moves before your thoughts do. You silence it. You lie still with your eyes shut and perform the only calculation you are capable of at that moment: how many more minutes can I steal.

Nine minutes later, the same thing. Sometimes three times over.

When you finally get up it is not a decision, it is a surrender. You cross the hallway in the dark. Your mouth is dry, your neck is heavy, and you have that specific sensation of not having entirely come back. You put the kettle on, you look out at a sky that has not yet decided whether to be morning, and you wonder, again, what exactly is wrong with you.

Because you did sleep. Seven hours, maybe eight. You went to bed at a sensible time. You did not drink. You did nothing especially stupid.

And yet.

Nothing is wrong with you

Before any explanation, this book can offer you the end of a suspicion. What you feel in that first hour is not a malfunction. It is the normal, universal, thoroughly documented state of a human being who has just woken up, and it has a name.

Researchers call it sleep inertia: the transitional state of lowered alertness immediately after waking, with its disorientation, its slowness and its clumsiness.[1] That it has a name at all should already tell you something. This is a measured phenomenon with a fifty-year literature, not a personal weakness.

And here is the figure that surprises almost everyone. A Harvard team tracked how sleep inertia clears after a full eight-hour night. Recovery follows a curve that is fast at first and then increasingly slow, with fitted time constants of about forty minutes for how alert people felt and about seventy minutes for how much thinking they could actually do. Full recovery is approached only after **two to four hours.**[2]

Two to four hours, after a complete night. A substantial part of your morning is spent in a state of incomplete recovery, and that is simply how the machine works.

The chronic version, where someone feels unrefreshed for months despite normal sleep duration and no identifiable disorder, is a distinct and less common thing. A survey of 25,580 people across seven European countries put it at 10.8 per cent, higher in women than in men, and ranging from 2.4 per cent in Spain to 16.1 per cent in the United Kingdom.[3] That spread is large enough that some of it is surely cultural reporting rather than biology, and the instruments used to measure the complaint are not well validated, as the literature itself acknowledges.[4] Treat it as an order of magnitude.

The three explanations you have been given

You already have a theory about yourself. You built it out of the explanations on offer, and the three most common ones are wrong or badly misunderstood. What they share is that all three send you to repair a part that is not broken.

First story: you need eight hours

This is the most repeated and least examined number in modern health advice, and it has a fatal problem. **No scientific body actually recommends it.**

The American Academy of Sleep Medicine, jointly with the Sleep Research Society, does not say eight hours. It states a floor: seven or more hours per night, on a regular basis.[5] The National Sleep Foundation publishes a range, seven to nine hours for adults between eighteen and sixty-four.[6] Neither names eight as a target. Eight is simply the convenient middle of an interval, rounded by repetition until it became a rule nobody wrote.

The history of these recommendations is worth a paragraph of its own. An Australian team gathered thirty-two sets of published sleep guidance issued between 1897 and 2009 and found something uncomfortable: the recommended duration always sat about thirty-seven minutes above what people were actually sleeping at the time, and it fell across the century at almost exactly the same rate as real sleep fell. The authors note that the absence of empirical grounding for these recommendations was universally acknowledged by the very people issuing them.[7] The number never measured your need. It measured your contemporaries, plus a margin of disapproval.

None of which means duration does not matter. It does, and your own requirement is partly inherited: a meta-analysis of twin studies covering more than forty-five thousand people puts the heritability of sleep duration between 38 and 46 per cent.[8] What is false is not that duration counts. It is that one number could possibly fit everyone.

Second story: you are not a morning person

This one contains a real truth, which makes it more dangerous than the first.

The differences between people who fall asleep early and people who do everything later are genuine, and they can be measured in the body. Among 172 young adults tracked for six days, the low point of core body temperature, which is the bottom of the biological day, fell at 3.50 a.m. in morning types but at **6.01 a.m. in evening types**.[9] Two hours of difference between two people sitting down at the same desk at nine.

But the sentence, as people use it, is not an observation. It is a sentence in the judicial sense. It converts an adjustable setting into a permanent trait. Your internal clock is not your eye colour. It moves, within known limits, by known means, and a good part of this book does nothing but show you how.

Third story: you lack willpower

The most unjust of the three, and much the most common. It rests on a simple and entirely false premise: that waking up is an act of decision.

It is not. Waking is a physiological process that begins one to three hours before your eyes open, involving your core temperature, a hormone called cortisol, the clearance of molecules that accumulated overnight, and precisely where in your biological cycle the noise caught you. The next chapter is devoted to that machinery.

There is even a measurement of the injustice. When volunteers are woken during their biological night rather than their biological day, the cognitive impairment recorded immediately afterwards is **3.6 times larger**, and that gap holds regardless of which sleep stage was interrupted and how much sleep pressure had built up.[10] Same person, same hours slept, same willpower, and a factor of 3.6 depending on when. No amount of discipline compensates for that, because nobody decides their own core temperature.

> *Asking someone who wakes badly to show more willpower is like asking someone who is cold to want to be warm.*

What this book argues

> THE ARGUMENT
>
> **You were taught to count your hours of sleep. Nobody taught you where to put them.**
>
> Duration matters, and if yours is short this book will say so plainly. But it is only one of the causes of a hard morning. The other three, when you sleep, when you wake, and how you are woken, were never explained to you. They are also the ones you can start changing tomorrow.

Those three share a feature, and it is what gives this book its spine: they all answer to the same principal control, one almost nobody has discussed with you seriously. Light.

That is not a metaphor. Your biological clock cannot read a clock face. It does not know you have a train at seven. It has one dominant signal for working out where it is in the day, and that signal is light. Everything else, bedtime, room temperature, coffee, bedding, operates around that central control.

What this book will not do

It will not get you out of sleeping. This is the most important limit, and it belongs here rather than in a footnote. A controlled experiment restricted forty-eight volunteers to six hours, then to four, for fourteen consecutive nights. Cognitive deficits accumulated day after day in proportion to the restriction. After two weeks at six

hours, performance had fallen to the level seen after two full nights without sleep.[11]

And that same study contains the result that should stop you for a moment. **The sleepiness the participants reported did not distinguish the six-hour condition from the four-hour one.** They were measurably falling apart, and they could not feel it. If you are thinking right now that your own sleep is sufficient, that is precisely what was reported by people whose performance was collapsing. Chapter four will give you a way to check that does not depend on your opinion of yourself.

It does not treat anything. It describes ordinary physiology and proposes adjustments to daily life, grounded in published work. It does not replace a doctor at any point.

READ THIS BEFORE GOING ON

A significant share of tired mornings are neither a timing problem nor a duration problem, but a disorder that needs diagnosing. Obstructive sleep apnoea alone is estimated to affect around **936 million adults aged thirty to sixty-nine** worldwide in its mild-to-severe form, and 425 million in its moderate-to-severe form.[12] It produces fragmented, unrefreshing sleep whatever time you go to bed and however long you stay there, and no waking method corrects it.

If you snore heavily with pauses in your breathing, if anyone has told you that you seem to stop breathing at night, if you fall asleep without intending to during the day, or if your tiredness comes with persistent low mood, this book is not your first step. A doctor is. Chapter four will help you tell the two situations apart.

WHAT TO TAKE AWAY

- Feeling wrecked immediately after waking is normal and universal. After a full night, full recovery takes two to four hours.
- No scientific body recommends eight hours. The official guidance says seven or more, or seven to nine.
- Waking during your biological night impairs you 3.6 times more than waking during your biological day. That is not a willpower gap.
- Duration still matters, and people in sleep debt are the worst possible judges of their own state.
- Persistent morning exhaustion can be a medical symptom. This book will help you spot that, not treat it.

PART I · WHY YOU WAKE UP TIRED

2

What actually happens when you wake up

Between the moment the sound goes off and the moment you become yourself again, a specific sequence runs in your body. Nobody has ever described it to you. Here it is.

The previous chapter gave sleep inertia its name and its duration. This one takes it apart, because once you can see the mechanism you can see which parts of it you are able to move.

The remedies you have been using were tested

This is the most useful detail in the Harvard study, and it is almost never reported. The researchers compared two conditions. In one, participants got up, showered and ate breakfast under ordinary lighting. In the other, they stayed in bed in dim light.

The recovery curve was the same.[2]

The shower, the breakfast and switching on the kitchen lights did not speed up the clearance of sleep inertia. That does not make them pointless; they are part of getting going and they have their own value. It means they do not treat the thing under discussion, and that if you have been doing them for years without result, it is not because you were doing them wrong.

> **WHY THIS MATTERS FOR THE METHOD**
>
> If the morning ritual cannot shorten sleep inertia, the only remaining strategy is to make it weaker before it starts. Its severity depends on identifiable factors: where in your biological cycle the waking happens, how much sleep debt you are carrying, and to a smaller extent how the waking happens. Those three are exactly what the rest of this book works on.

The ninety-minute myth

You have probably been told to sleep in ninety-minute blocks and set your alarm for the end of a cycle. The idea is appealing, it has the charm of arithmetic, and it does not survive contact with the data.

The largest analysis available covered 6,064 cycles recorded in the laboratory from 369 participants. The median cycle is not ninety minutes but **ninety-six**, with substantial variation between individuals, a consistently shorter first cycle, and differences related to age, sex and accumulated sleep pressure.[13] Standard reference works give a wide range: seventy to a hundred minutes for the first cycle, ninety to a hundred and twenty for later ones.[14]

Ninety is not your number. It is a population average, rounded.

And even if you knew your own, a practical obstacle would remain. Devices that promise to wake you at the end of a cycle must identify your sleep stages to do it. A validation study of eleven consumer trackers, compared against full polysomnography across 349,114 recording windows, placed their stage-classification performance between 0.26 and 0.69 on a scale where 1 is perfect.[15] None comes close to the reliability the promise requires.

What is true instead

The night is not uniform. Deep slow-wave sleep clusters in the first third, and REM sleep lengthens and dominates in the last. But the two are not run by the same controller: REM is timed by your circadian rhythm, while deep sleep answers to the sleep pressure accumulated since you last woke.[16] That distinction sounds

technical. It is the reason a night shifted by three hours is not remotely the same night taken at your usual time.

Your temperature, and why it decides everything

There is a curve in your body that governs your mornings and that you have probably never heard of: your core body temperature. It rises through the day, falls at night, and reaches its lowest point a few hours before your habitual waking time.

How many hours depends on you. In young adults of the morning type, the gap between the temperature low and habitual wake time averages three hours and eighteen minutes. In evening types it falls to **two hours and sixteen minutes**. In older morning types it drops to one hour and thirty-two.[17]

Translate that. If you lean towards the evening and your alarm goes at 6.30, your temperature low sits around 4.15. You are getting up barely two hours after the deepest point of your biological day, while your body is still running its night programme. If your colleague leans towards the morning, their low passed more than three hours ago and the climb is well under way. You get up at the same time. You do not get up at the same moment.

This is where the number from the previous chapter acquires its full meaning. The factor of 3.6 between waking in your biological night and waking in your biological day[10] is not a laboratory curiosity. It is a description of what happens to you every morning.

The hormone that is waiting for you

Meanwhile something else is preparing, and it is rather good news about what your body can do.

In the thirty to forty-five minutes after waking, your cortisol level rises sharply in a pattern researchers call the cortisol awakening response.[18] The size of that rise was measured at 50 to 75 per cent across three independent samples totalling 152 people,[19] and a broader review gives a range of 50 to 160 per cent, with no agreed normal values.[20]

More striking still, the preparation starts before you are awake. When volunteers know what time they will be woken, the hormone that drives cortisol production begins climbing about an hour before the announced time.[21] Your body anticipates. It sets off before you do.

But not at just any hour

Here is the point that matters for everything that follows, and it is counter-intuitive. That cortisol rise is not triggered by your eyes opening. It is under circadian control.

When participants' internal clocks are experimentally uncoupled from their schedules, the cortisol awakening response peaks at a biological phase corresponding to about 3.40 in the morning, and becomes **undetectable** at phases corresponding to the afternoon.[22]

In other words, if you wake at the wrong point in your cycle, your body does not hand you the hormonal push it reserves for the right one. You are not merely waking up tired. You are waking up without the help you would have been given three hours later.

And adenosine? Careful

You may have read that adenosine builds up in your brain through the day, creates sleep pressure, and is cleared overnight. The story is everywhere. It is directionally reasonable and stated far more confidently than the evidence allows.

The framework it sits inside, the two-process model, is solid: sleep as the product of a homeostatic pressure that grows with time awake interacting with an independent circadian rhythm.[23, 24] That model is among the most robust in the field.

But the direct measurement of adenosine accumulating and then clearing was done **in animals**, specifically in cats, not in humans.[25] The best human evidence available is indirect: after twenty-four hours without sleep, the availability of one type of adenosine receptor increases in the brain, by at most 15.3 per cent in a frontal region.[26] That measures receptors, not the molecule. The researcher who summarised this dossier best gave his review a title ending in a question mark, and the punctuation was deliberate.[27]

So hold adenosine as the leading candidate mechanism for sleep pressure, not as an established fact. I flag it because a book asking for your trust across two hundred pages owes you the difference between what it knows and what it supposes.

So, are you normal?

Take the question from chapter one again, now with the parts in hand.

Feeling degraded straight after waking, despite a night of reasonable length, is the universal and expected state. Its severity

depends chiefly on where in your cycle the waking falls, and it is sharply worsened by sleep debt: chronic restriction to five hours thirty-six degrades performance measured two minutes after waking by around 10 per cent, across the whole recovery window.[28]

That study adds a note which by now should feel familiar: the restricted participants did not report feeling any sleepier than the others. Once again, the feeling does not track the measurement.

There is also a separate situation, called non-restorative sleep: feeling persistently unrefreshed on waking *while sleep duration is normal and no sleep disorder is present*.[29] That is the clinical version, and it is what the European prevalence figure in chapter one was counting.

The difference between the two is simple, and chapter four is built on it. Sleep inertia lasts a morning. Non-restorative sleep lasts months.

WHAT TO TAKE AWAY

- Showering, eating breakfast and turning on the lights were tested against staying in bed in the dark. The recovery curve is identical.
- The sleep cycle runs a median of ninety-six minutes, not ninety, varies between people, and no consumer device tracks it reliably.
- Your temperature low precedes your waking by one and a half to three and a half hours depending on chronotype and age. It is what decides how hard the morning is.

- The morning cortisol rise is commanded by your internal clock, not by your eyes opening. At the wrong biological hour it does not arrive.
- Adenosine is the leading candidate explanation for sleep pressure, not a settled one, and the direct measurements were made in animals.

PART I · WHY YOU WAKE UP TIRED

3

Your internal clock, and why it is running late

You own a clock that cannot read a clock. It has to be reset every single day, and there is only one signal it really trusts.

Somewhere behind your eyes, in a piece of tissue about the size of a grain of rice, roughly twenty thousand cells are keeping time. They do it whether or not you are asleep, whether or not you are looking at anything, and whether or not you agree with the result.

That structure is called the suprachiasmatic nucleus, and everything in this book eventually comes back to it. It sets when you get sleepy, when your temperature bottoms out, when cortisol rises, and therefore how you feel at 6.30 in the morning. It is the reason two people can sleep the same hours and wake up in completely different states.

It is also, and this is the useful part, adjustable.

How we know it is the clock

The evidence arrived in two halves, and both halves come from animals. I say that plainly because the equivalent experiments have never been done in humans and never will be.

The first half is subtraction. In 1972, two laboratories independently destroyed this small structure in rats and watched their daily rhythms of drinking and movement disappear entirely, while lesions of the neighbouring tissue left those rhythms intact.[30] Take the structure away and the rhythm goes with it.

The second half is addition, and it is the more elegant experiment. In 1990, researchers took clock tissue from a hamster with a genetically shortened cycle and transplanted it into hamsters whose own clocks had been removed. Rhythms returned. And they

returned **running at the donor's period, not the host's.**[31] The tissue was not merely necessary for the rhythm. It was carrying it.

In humans the case rests on comparative anatomy, on molecular work, and on one natural experiment that turns out to be decisive. We will come to it shortly.[32]

It does not run at twenty-four hours

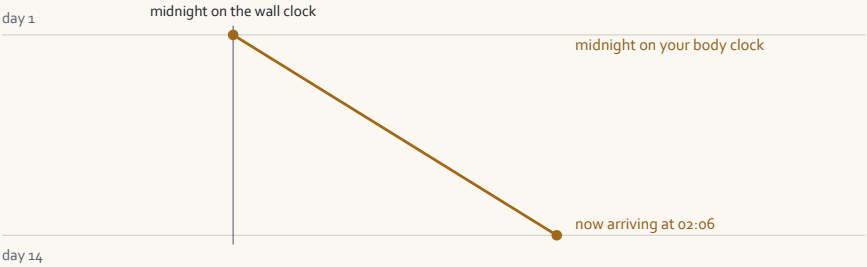
Here is the fact that reorganises everything else.

For most of the twentieth century, the human clock was believed to run at about twenty-five hours. Studies of people isolated from time cues reported periods scattered anywhere from thirteen to sixty-five hours. Then, in 1999, a Harvard group used a protocol that deliberately separated the internal clock from the sleep schedule and produced a very different answer: the human circadian period averages **24.18 hours**, with a tight distribution and no difference between younger and older adults. The old numbers, the authors concluded, were artefacts caused by light levels high enough to confound the measurement.[33]

The largest sample assembled since, 157 adults between eighteen and seventy-four, refined the figure to 24.15 hours. It also found a small but real sex difference: 24.09 hours in women against 24.19 in men, with roughly 35 per cent of women running shorter than twenty-four hours compared with 14 per cent of men.[34]

One caveat belongs here. Your period is not a fixed personal constant. In one experiment it measured about six minutes longer after volunteers had been living on a long artificial day than after a short one, meaning the clock carries a trace of whatever schedule

preceded the measurement.[35] Seven men, so hold it lightly. Treat 24.15 hours as the best current estimate rather than a constant of nature.



Nine minutes a day. At 24.15 hours, an unreset clock slips about nine minutes later every day. Over a fortnight the two midnights are more than two hours apart. This is why entrainment is not a refinement but a daily necessity.

Nine minutes does not sound like much. It is why you cannot feel the problem happening, and it is also why the correction has to happen every single day.

The one signal it trusts

So what resets it? You will have guessed light, because this book has been signalling that since chapter one. But the evidence for it is stronger and stranger than most people realise, and it comes from a group nobody thinks to ask.

Consider someone who is totally blind. They live in society. They eat at normal hours, work normal days, see friends, take the bus, exercise, go to bed when their household goes to bed. Every social and behavioural time cue that has ever been proposed is present in

their life in full measure. The only thing missing is light reaching the clock.

When researchers measured their rhythms, they found that most had abnormal circadian timing, and in around half the rhythms were simply **running free**, drifting later and later regardless of the entirely normal life being lived around them.[36]

That is as close to a controlled experiment on the question as ethics will ever allow, and its verdict is blunt. Remove light and the rest of the scaffolding does not hold the clock in place.

What about food, exercise, routine?

These are collectively called non-photic cues, and the honest summary is that their power in humans is much less established than the wellness literature suggests. A critical review of the whole area concluded that the best-supported non-photic agents are timed exercise and melatonin taken as a supplement, and that in blind people who did manage to stay entrained, the responsible cue was never identified.[37] Social routine alone has never been shown to entrain a human clock.

Meal timing is the interesting case, because there is a clean experiment. When researchers delayed volunteers' meals by five hours, the rhythm of blood glucose shifted by nearly the full five hours, and a clock gene in fat tissue shifted too. But the central markers, melatonin and cortisol, **did not move at all.**[38]

Which tells you something worth carrying into the rest of the book: you have more than one clock. Eating late will move the ones in your liver and your fat tissue. It will not move the one that

decides how your 6.30 alarm feels. Ten young men, so hold it lightly, but the result is clean.

> **WHY THIS MATTERS FOR THE METHOD**
>
> If light dominates, then the levers in Part III, temperature, timing, caffeine, evening routine, are real but secondary. They work around the clock rather than on it. This is the reason the method in Part V is sequenced the way it is: light first, everything else afterwards. Doing it the other way round is what most people try, and it is why most people find that sleep advice does very little.

What it looks like when the signal is strong

There is a study that makes all of this tangible, and it involves camping.

Researchers measured the internal timing of eight adults living their ordinary lives, then sent them into the mountains for a week with no torches, no phones and no electric light, and measured them again. After seven days of nothing but sunlight and campfire, their clocks had shifted so that biological night began at sunset. The people who had been most out of step to begin with, the late types, moved the most.[39]

It is a small summer field study and it does not establish a dose. What it establishes is a ceiling: the human clock is not stuck, and the size of the correction available is substantial.

The practical problem is that most of us live at a light intensity closer to twilight than to daylight. An international expert consensus now recommends a minimum daytime exposure roughly

equivalent to a bright overcast day at the eye, and a maximum in the evening roughly equivalent to candlelight.[40] Most indoor lives invert that arrangement.

The gap you live in

Now put the pieces together and you get the shape of the modern problem.

Your clock runs slightly long. Your workdays force it early. Your weekends let it run late. The result is a chronic mismatch between biological time and social time, which researchers named **social jetlag**: the difference between the middle of your sleep on a working day and the middle of your sleep on a free day.[41]

If you sleep midnight to seven on weekdays and 2 a.m. to 10 a.m. at weekends, the midpoint moves from 3.30 to 6 a.m. That is two and a half hours. You are, in effect, flying to another time zone on Friday night and flying back on Monday morning, every week, without ever leaving home.

I want to be careful here, because this concept has been oversold. The researcher who coined it published a self-critical review conceding that the measure may be too simplistic, questioning what it actually captures, and stressing that almost all of the health associations attached to it come from cross-sectional data that cannot establish cause.[42] When the inventor of a concept publishes its limitations, that is worth more than another study confirming it.

So take social jetlag as a useful description of a real mismatch, and not as a diagnosis or a quantified risk.

Why the timing changes the sleep itself

One last result, and it is the oldest in this chapter and among the cleanest in the field.

In 1980, twelve volunteers lived without time cues and went to bed whenever they wished. Their sleep episodes varied two- to threefold in length. What predicted how long they slept was not how long they had been awake beforehand. It was **the circadian phase at which they went to bed.**[43]

Read that again, because it undoes a piece of common sense. Going to bed tired does not determine how long you sleep. Going to bed at the right point in your own cycle does. This is why lying down early after a bad night so often produces nothing but an hour of staring at the ceiling, and why the method in this book fixes your waking time rather than your bedtime.

WHAT TO TAKE AWAY

- Your central clock sits in a structure the size of a grain of rice. The proof that it carries time comes from animal transplant experiments, not from humans.
- It runs at about 24.15 hours, not 24. Left alone it slips roughly nine minutes later every day, so it has to be reset daily.
- Light is the signal that resets it. Around half of totally blind people drift free despite completely normal social lives, which is as close to proof as this question gets.
- Meal timing moves the clocks in your organs but leaves the central one where it is. Social routine alone has never been shown to entrain a human.

- How long you sleep depends more on when you go to bed relative to your own cycle than on how tired you were.

PART I · WHY YOU WAKE UP TIRED

4

Six causes, and how to find yours

This is the most important chapter in the book, and the one most likely to tell you that the answer is not in the book.

Everything so far has described a machine. This chapter asks which part of yours is actually failing, because the honest answer is that there are six candidates, they need different responses, and one of them is not a lifestyle problem at all.

Most sleep books skip this. They have one explanation and they apply it to everybody, which is efficient for the author and useless for the reader who happens to have a different problem. It is also, on this particular subject, unsafe. Waking up exhausted is a symptom as often as it is a habit, and there is no version of that sentence that is good for book sales.

The six

One: you are genuinely not sleeping enough

The dullest answer, and more common than the people concerned believe. What makes it difficult is not the arithmetic but the self-assessment: as chapter one described, in a controlled experiment people restricted to six hours and to four hours reported almost identical sleepiness while their measured performance diverged sharply.[11] Your sense of how rested you are is not a reliable instrument.

So do not consult your impression. Use this instead.

THE HOLIDAY TEST

1. Think of the last time you slept without an alarm for at least a week. A holiday, a break, an illness.
2. Ignore the first three nights. Those are repayment, not baseline.
3. From the fourth night onwards, how long were you sleeping?
4. Compare that with your usual working night. A gap of an hour or more, repeatedly, means the first cause is at least part of yours.

If you cannot remember such a week, that is itself informative.

Two: you are sleeping at the wrong time for your clock

Your duration is adequate but your window is in the wrong place, which chapter three described in detail. The signature is a large gap between your working days and your free days: if the midpoint of your sleep moves by two hours or more when nobody is making you get up, your schedule and your biology are not the same shape.

A second signature is that you feel noticeably better on holiday within a few days, in a way that more sleep alone does not explain.

Three: you are being woken at the worst possible moment

Duration adequate, window roughly right, but the alarm lands close to your temperature low, deep in the biological night, where impairment on waking is up to 3.6 times greater.[10] The signature here is specific: the first thirty to sixty minutes are brutal and then

you are broadly fine. If by ten in the morning you feel normal, this is your cause rather than the first one.

Four: your sleep is being broken without your knowledge

You are in bed for eight hours and asleep for considerably less, and you do not remember any of it. A hot room, a snoring partner, a young child, an untreated pain problem and a full bladder all do this.

So does alcohol, though not in the way it is usually described, and this is worth getting right because almost every book on this subject has it the wrong way round. A meta-analysis of twenty-seven studies found that alcohol cuts REM sleep and pushes it later at doses as low as **two standard drinks**. What it did *not* confirm was the widely repeated claim that alcohol fragments the second half of the night: pooled across studies, the effects on wakefulness during the night carried large uncertainty. And the sedative head start people believe they are buying only appeared at around five drinks, a dose that does plenty of other damage.[44]

The practical version is therefore simpler and stricter than the usual advice. Two glasses of wine with dinner is already enough to change the shape of your night. It is not a threshold you cross at some larger amount.

The signature is a mismatch: long hours in bed, no memory of waking, and no benefit from adding more hours. If extending your night does nothing at all, stop extending it and look at what is interrupting it.

Five: a medical condition is producing the tiredness

This is the cause the rest of the book cannot help you with, and it is not rare. It has its own section below.

Six: something you are taking is doing it

Medicines are a common and badly underweighted cause. A network meta-analysis of 216 trials found that thirteen antidepressants increased daytime somnolence relative to placebo while eleven increased insomnia,[45] which is a useful corrective to the idea that any drug class has one predictable effect on sleep. Long-term opioid therapy alters sleep architecture and is associated with sleep-related breathing problems.[46] Beta-blockers suppress night-time melatonin production.[47]

The signature is chronological: your tiredness began, or clearly worsened, within a few weeks of starting or changing something. If that describes you, the next step is a conversation with whoever prescribed it.

> **DO NOT STOP A PRESCRIBED MEDICINE BECAUSE OF THIS BOOK**
>
> This applies with particular force to sleeping tablets. Abrupt withdrawal from benzodiazepines and related drugs can cause confusion, hallucinations, disturbed consciousness, **seizures and coma**. Coming off them is done gradually and with the prescriber, over weeks to months.
>
> Bring this book to the appointment if it helps. Do not act on it alone.

When it is medical

Here is the part that the commercial logic of a book like this one argues against including, and that is precisely why it is here.

Feeling persistently unrefreshed is a recognised clinical symptom, not merely a complaint. Unrefreshing sleep and fatigue appear in the formal diagnostic criteria for obstructive sleep apnoea in adults, alongside sleepiness.[48] One national clinical guideline lists *sleep preserved in duration but non-restorative, without associated depression* as an explicit indication for a sleep study.[49] That description is likely to fit a good number of the people reading this.

The thing about sleep apnoea that almost nobody tells you

The public image of sleep apnoea is a large man who snores like a chainsaw and falls asleep in meetings. That image is why a great many people never consider it.

When researchers asked patients being assessed for apnoea what they actually experienced, fatigue was reported by 57 per cent, tiredness by 61 per cent and lack of energy by 62 per cent, against sleepiness at 47 per cent. Asked to name their single most significant symptom, around 40 per cent chose lack of energy and only about 22 per cent chose sleepiness.[50] **Tiredness, not sleepiness, is the usual presenting complaint.**

And the picture differs sharply by sex. Up to 40 per cent of women with a significant number of breathing events report none of the classic symptoms at all, and the standard screening tools were built around the male presentation.[51] A woman who wakes

exhausted, does not snore dramatically and does not doze off in meetings can still have meaningful sleep apnoea.

I should also be careful in the other direction, because this is a field with a genuine over-diagnosis problem. In a Swiss population study using full overnight recording, a moderate-or-higher rate of breathing events was found in about half of men aged forty to eighty-five. The same study found **no association between the severity of those events and daytime sleepiness.**[52] Breathing events are extremely common, and they are not the same thing as a disease. What makes it a disorder is the combination with symptoms and consequences.

Which is why this book will not give you a scored questionnaire. The best-known screening tool has a sensitivity of 88 per cent but a specificity of 42 per cent in the general population: roughly six out of ten people it flags do not have moderate apnoea. It is an instrument for ruling out, not for ruling in, and its negative predictive value of 93 per cent is the genuinely useful half.[53] The relevant professional body recommends, at its strongest level, that questionnaires **not** be used to diagnose apnoea without an actual sleep recording.[54]

So no score. Just this: if several of the following describe you, that is a reason to ask a doctor, and it is not a diagnosis.

WORTH RAISING WITH A DOCTOR

1. You snore loudly, or someone has told you that you stop breathing, gasp or choke in your sleep.

2. You wake with headaches, a dry mouth, or the sensation of having been suffocating.
3. You get up to urinate more than once most nights.
4. You have high blood pressure, particularly if it is difficult to control.
5. You feel unrefreshed on waking whatever time you go to bed and however long you stay there.
6. You fall asleep unintentionally during the day.

The blood test conversation

Two ordinary blood tests explain a meaningful share of unexplained fatigue, and both are available from a general practitioner.

The first is iron. Depleted iron stores are common, particularly in women who menstruate, and they produce exactly the fatigue this book is about. But here is the hard rule, and it is a safety rule rather than a preference: **never take iron supplements without a blood test first.** In men and in women past the menopause, roughly a third of iron-deficiency anaemias turn out to have an underlying cause, most often in the gut. Supplementing blind can normalise the blood count and delay that diagnosis.[55] Iron follows a test. Always.

The second is thyroid function, which is a single test. Here I owe you a caution in the opposite direction. A large randomised trial gave thyroid hormone to older adults with mildly abnormal test results and measured tiredness as a named outcome. The hormone corrected the blood test. It produced **no improvement in tiredness at all**, with a difference of 0.4 points on a scale where about 9 points is the smallest change a person would notice.[56] A mildly

abnormal thyroid result is worth knowing about. It is usually not the explanation for how you feel, and treating it usually will not fix it.

Low mood

Depression presents as exhaustion at least as often as it presents as sadness, and the relationship with sleep runs in both directions: across twenty-one longitudinal studies, people with insomnia who were not depressed had roughly double the odds of developing depression later.[57]

If your tiredness comes with a loss of interest in things you used to enjoy, or a persistent flatness, that is worth saying out loud to a doctor rather than solving with a better morning routine.

> **IF YOU ARE HAVING THOUGHTS OF HARMING YOURSELF**
>
> Please contact your local emergency number or a crisis helpline now, rather than continuing with this book. In many countries these services are free, confidential and staffed around the clock.

Restless legs

An urge to move the legs, usually with an uncomfortable sensation, that begins or worsens at rest, is relieved by moving, and is worse in the evening or at night. All of those must be present, and a fifth condition matters as much as the other four: the symptoms must not be better explained by something else, such as cramps, positional discomfort, arthritis or simple habit.[58] That fifth criterion exists because shorter checklists produce very poor specificity, and

prevalence estimates swing from roughly 15 per cent down to about 2 per cent depending purely on how strictly the condition is defined.[59]

One distinguishing detail worth knowing: restless legs characteristically produces unrefreshing sleep and fatigue rather than pronounced daytime sleepiness. If you have both the leg symptoms and heavy sleepiness, that combination suggests something additional is going on, most obviously apnoea.[58]

If it turns out to be insomnia

Chronic insomnia has a specific definition: difficulty falling asleep, staying asleep or waking too early, at least three nights a week, for at least three months, despite adequate opportunity, with daytime consequences.

If that is you, the most useful sentence in this book may be that **the first-line treatment is not medication.** The European guideline recommends cognitive behavioural therapy for insomnia as the first-line treatment for adults of any age, delivered in person or digitally, at its highest grade.[60] The American guideline concurs at its strongest level.[61]

And that same American guideline contains a recommendation that is awkward for the entire self-help sleep genre, so let me quote its substance rather than hide it: clinicians are advised **not** to use sleep hygiene as a single-component therapy for chronic insomnia.[61] Sleep hygiene is the familiar list, dark room, cool room, no screens, no late coffee. It is not useless, but on its own it is not treatment, and a book whose method amounted to that list would be selling

you the one component the evidence specifically advises against using alone.

It is also the reason the method in Part V is built the way it is. It is not a hygiene list.

Two hard stops

> **DRIVING**
>
> If you have fallen asleep at the wheel, or caught yourself close to it, stop driving and see a doctor before you do anything else in this book. Excessive sleepiness that persists despite treatment is, in many countries, formally incompatible with holding a licence, and the medical assessment exists for good reason.
>
> This book must not become the thing you read instead of getting assessed.

> **ACTING OUT DREAMS**
>
> If you or your partner report shouting, punching, kicking or otherwise physically acting out dreams during sleep, mention it to a doctor. It is not something to manage yourself, and it is not covered by anything in this book.

Where to go from here

The point of this chapter is that the same tired morning has several different origins, and that the right response depends on which one

you have.

YOUR ROUTE THROUGH THE REST OF THE BOOK

1. **Cause one, not enough sleep.** The method still applies, but read chapter 9 on regularity first, and be honest about the arithmetic. No amount of light substitutes for hours.
2. **Causes two and three, wrong timing or bad waking.** This is what the book was written for. Continue straight into Part II.
3. **Cause four, fragmentation.** Read chapters 8 and 10, on temperature and on what you consume, before starting the method.
4. **Cause five, medical.** Make an appointment. Come back to the method afterwards, once you know what you are dealing with.
5. **Cause six, medication.** Speak to your prescriber. Change nothing on your own.

If more than one of these describes you, that is normal, and it is the usual case rather than the exception. Work through them in the order above, because the first two are the ones that make everything else easier to judge.

WHAT TO TAKE AWAY

- Six distinct causes produce the same tired morning, and they need different responses.

- You are not a reliable judge of your own sleep debt. Use the holiday test rather than your impression.
- In sleep apnoea, tiredness and low energy are reported more often than sleepiness, and up to 40 per cent of women with significant apnoea have none of the classic symptoms.
- Never take iron without a blood test. A mildly abnormal thyroid result usually does not explain fatigue, and treating it usually does not fix it.
- For chronic insomnia the recommended first-line treatment is cognitive behavioural therapy, not medication, and not sleep hygiene on its own.

PART II · LIGHT, THE MASTER LEVER

5

The only signal your brain really listens to

The same light, at two different hours, does opposite things to you. This is the most useful fact in the book, and almost nobody has been told it.

Your eyes do two jobs. One of them you are aware of. You are using it now: photons land on the back of your eye, and a picture appears. The other job runs continuously, reports to a different part of your brain, and produces no sensation whatsoever.

For most of the twentieth century nobody knew the second job existed. Rods and cones did vision, and it was assumed they must also be the source of the light signal reaching the clock. That assumption turned out to be wrong.

In 2002, two papers published back to back reported a third class of photoreceptor in the retina: cells that project to the clock rather than to the visual system, and that respond to light directly, even when all input from rods and cones is blocked. They are most sensitive to light at around 484 nanometres, in the blue part of the spectrum, and their response is slow and sluggish compared with vision.[62, 63]

These are, in effect, light meters rather than cameras. They do not care what you are looking at. They report how much blue-ish light has been arriving, and for how long.

Everything practical in this chapter follows from the properties of that system: **it wants intensity, it prefers a particular colour, and above all it cares enormously about timing.**

Intensity: your indoor life is dimmer than you think

Human eyes are superb at hiding this from you. Step outside on an overcast morning and you might be receiving ten thousand units of

light. Step into a well-lit office and you might be receiving three hundred. Your vision compensates so smoothly that both feel simply like daylight.

Your clock is not fooled, and it turns out to be more sensitive than anyone expected. In a landmark study, half of the maximum phase-shifting response to very bright light was obtained with just over one per cent of that light, with the half-maximal effect falling somewhere between eighty and a hundred and sixty units.[67] Later work put the median threshold for suppressing melatonin at around twenty-five units.[68]

Twenty-five units is a dim living room. This is the finding behind every headline telling you that ordinary evening lighting is disrupting your sleep, and the underlying result is real: light below two hundred units before bedtime suppressed melatonin by more than half in the large majority of trials.[69]

Two things must be said about those numbers before you build anything on them.

The exposures were long. Every one of those results used five to six and a half hours of continuous light, in people who were awake with their eyes open. That matters a great deal, and chapter six is where it matters most.

The variation between people is enormous. In the study that found a median threshold of twenty-five units, individual thresholds ranged from six to three hundred and fifty, a spread of more than fifty-fold.[68] Population averages are close to useless for predicting you. Some people really can read under a bright lamp until midnight and sleep; others are affected by a hallway light. Neither is imagining it.

Colour matters more than brightness

Because the system is tuned to blue, the ordinary measure of brightness is the wrong yardstick.

The clearest demonstration: six and a half hours of narrow blue light at just eleven units produced about seventy-five per cent of the phase shift produced by ten thousand units of white light.[70] Eleven units of the right colour did most of the work of ten thousand units of the wrong one. (The pupils were pharmacologically widened in that experiment, so do not take the ratio home; take the principle.)

An international expert consensus now recommends stating light doses in a unit weighted for this biological sensitivity rather than for vision, and sets three targets: a daytime minimum roughly equivalent to a bright overcast sky, an evening maximum in the last three hours before bed roughly equivalent to candlelight, and near-darkness during sleep.[40]

Keep that distinction, because it will come up again: **the brightness figure printed on a lamp is measured for your vision, not for your clock, and for a warm-coloured source it substantially overstates the dose your clock receives.**

Timing: the fact that changes everything

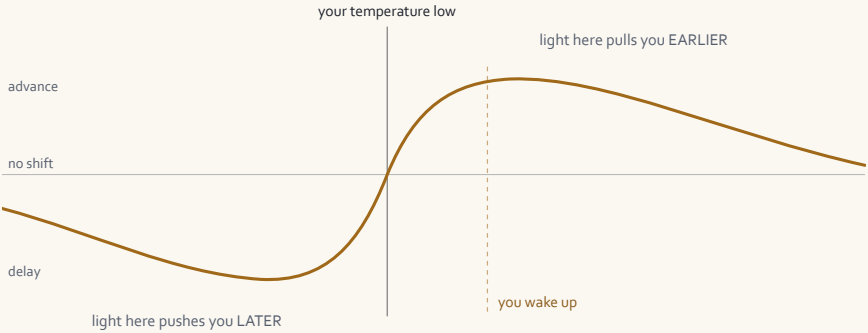
Here is the part that is almost never explained outside the research literature, and that quietly determines whether your morning routine is helping you or working against you.

Light does not simply "set" your clock. It shifts it, and the direction of the shift depends entirely on when the light arrives relative to

your own biology. The map of that relationship is called a phase response curve, and the human version was first sketched in 1991[66] and established in detail in 2003.

In that later study, volunteers received a single long pulse of bright light at different points in their cycle. The results ranged from a delay of three hours and thirty-six minutes to an advance of two hours, with a total swing of just over five hours between the extremes depending purely on timing.[64]

And the pivot point, the moment where delay flips to advance, sits at **the low point of your core body temperature.**



The same light, opposite effects. Light received before your temperature low pushes your clock later. Light received after it pulls your clock earlier. The crossover sits at the low point itself, which in most adults falls one and a half to three and a half hours before habitual waking. The shape is drawn from the published human curve; the exact amplitude depends on how bright and how long the exposure is.

Now combine this with a number from chapter two. Your temperature low falls one and a half to three and a half hours before you habitually wake, depending on your chronotype and your age.[17]

Which means that for most people, **ordinary waking already places you on the advancing side of the curve.** Light after you get up pulls your clock earlier. Light late in the evening, well before your temperature low, pushes it later. That single sentence is the mechanism behind almost every piece of sleep advice you have ever been given, and it explains why the advice works in one direction and not the other.

Short exposures are worth more than you would guess

The relationship between how long the light lasts and how much it shifts you is strongly non-linear. A one-hour pulse produced a total swing of two hours and twelve minutes, against just over five hours for a pulse nearly seven times longer.[65] Fifteen per cent of the duration bought about forty per cent of the effect.

This is genuinely good news for anyone with a life. It means the first minutes of light exposure do a disproportionate share of the work, and that a realistic twenty or thirty minutes outdoors is not a token gesture.

And the caution that has to travel with it

> **IF YOUR SLEEP IS SEVERELY DELAYED, READ THIS BEFORE ADDING MORNING LIGHT**
>
> The advice to get light on waking assumes your waking happens after your temperature low. For someone whose body clock is very late, and who is being forced out of bed hours before their biology intends, the alarm may go off *before* that low point.
>
> Light delivered there lands on the delaying side of the curve, and can push the clock further late, entrenching the problem it was meant to solve.[71] If you naturally fall asleep at three in the morning and are getting up at six, do not simply add bright light at six. Move your schedule gradually, as Part V sets out, or speak to a doctor.

What this chapter buys you

Four practical rules come out of the physiology, and everything in Part V is built on them.

THE FOUR RULES OF LIGHT

1. **Direction is set by timing, not by intensity.** Light after your temperature low pulls you earlier; light before it pushes you later. Getting the timing wrong cannot be fixed by making the light brighter.

2. **Outdoor light is in a different league from indoor light.** The gap between an overcast morning and a well-lit room is roughly thirty-fold, and your eyes will not tell you.
3. **Short counts.** The first minutes are worth disproportionately more than the last, so twenty minutes outdoors is a real intervention.
4. **Your own threshold may be nothing like the average.** With a fifty-fold spread between individuals, the only reliable calibration is your own, which is what the three weeks in Part V are for.

One question remains, and it is the one you are probably holding this book to answer: if light is this powerful, can a lamp beside your bed deliver it while you are still asleep?

That is the next chapter, and the answer is more interesting, and more honest, than the marketing suggests.

WHAT TO TAKE AWAY

- Your retina contains a third class of photoreceptor that reports to the clock rather than to vision, and is tuned to blue light around 484 nanometres.
- Your clock is sensitive to far less light than expected, but every demonstration of that used five to six hours of exposure with the eyes open.
- Individual sensitivity varies more than fiftyfold, so population averages predict very little about you.
- The same light shifts your clock later or earlier depending on whether it arrives before or after your temperature low.

- Most people wake after that low point, which is why morning light pulls the clock earlier. For severely delayed sleepers, that assumption can fail.

PART II · LIGHT, THE MASTER LEVER

6

The gentlest alarm there is

A light that comes up slowly while you sleep. It does something real, and it does not do the thing it is usually sold on.

The idea is old and it is a good one. Rather than being torn out of sleep by a noise, you are lifted out of it by a light that begins in near-darkness and climbs over half an hour, so that by the time your alarm is due you are already in the shallows rather than the depths.

Devices that do this have existed for decades and they are now sold everywhere, usually on the promise that they will reset your body clock. This chapter is where I tell you what the research actually shows, including the parts that are unhelpful to the company publishing this book.

The short version: **the effect on how you wake is real and reasonably well supported. The effect on your body clock is not.** Those are different claims, the literature separates them cleanly, and almost all the marketing you will encounter merges them.

What it genuinely does

It makes waking less unpleasant

The most relevant study for ordinary life ran in people's own bedrooms rather than a laboratory. Participants used an artificial dawn at home for two weeks at a time, and reported **significantly less sleep inertia**: less of the fog, the disorientation and the difficulty getting going.[74]

A controlled laboratory study found the same direction of effect and went further, reporting improvements in mood, in subjective wellbeing, and in several measures of cognitive performance after waking.[75]

A third study, a randomised crossover, measured alertness and performance in the half hour after waking and found modest improvements in both.[79] I say modest deliberately: it involved eight people, all of them selected because they already reported difficulty waking, and one of its three outcome measures did not reach significance. It points the same way as the others, which is worth something, and it is not on its own worth much.

This is the claim the evidence supports, and it is not a small one. Chapter two established that sleep inertia is universal, that it takes far longer to clear than people assume, and that the usual remedies do nothing for it. A method that reduces it at the source is worth having.

It may raise the morning cortisol rise

Here the picture is genuinely mixed and I will give you both halves.

One study found that a dawn signal climbing to around 250 units over the thirty minutes before waking significantly increased total cortisol production across the first forty-five minutes after waking, and raised subjective alertness. Twelve participants.[78] A laboratory study in young men likewise found an improved cortisol awakening response.[75]

But a later and better-powered study, in adults averaging sixty-seven years old, found **no effect at all** on the cortisol awakening response, and none on subjective or objective alertness either.[76]

Age is the obvious candidate explanation for the disagreement, and nobody has settled it. What you should take from this is that the cortisol claim is plausible and unproven, resting on studies of

twelve and seventeen people against a null result in twenty-three older ones.

It treats seasonal depression

In a randomised placebo-controlled trial for winter depression, dawn simulation performed comparably to conventional bright light therapy.[77] If you are affected by winter, this is a real and well-established use, and it is worth discussing with a doctor rather than self-managing.

What it does not do

Now the other half, and I would rather you read it here than discover it elsewhere.

The physics gets in the way first

You are asleep. Your eyes are closed. And a closed human eyelid is not a window, it is a filter, and a severe one.

Measurements of eyelid transmission put it at roughly **0.3 per cent for blue light and 0.3 per cent for green, against 5.6 per cent for red.**[72] Two things follow. First, almost everything is blocked. Second, what does get through is disproportionately red, which is precisely the part of the spectrum your clock is least sensitive to, as chapter five explained.

Run the arithmetic. A lamp delivering a few hundred units to your closed eyelid puts something of the order of one unit onto the retina, in the least effective colour. The most light-sensitive individual in a study of fifty-five people needed six units, over five

hours, for a weaker effect than phase shifting. A dawn lamp is not close.

And the studies agree with the physics

Four controlled tests have looked specifically for a shift in circadian timing from dawn simulation. Three found none.

Healthy volunteers, six consecutive dawns, up to a thousand units. No phase advance. What the dawn did do was prevent the drift that occurred in the control condition, which is a maintenance effect rather than a shift. And a detail almost never reported: participants were *woken at six in the morning to watch the dawn with their eyes open*, with staff verifying it. While actually asleep, they received between 0.003 and 0.1 units, which is moonlight.[73]

Two weeks of home use at 250 units and at 50 units. Sleep inertia improved significantly. Melatonin timing did not shift. The authors' own conclusion is worth quoting in substance: mechanisms other than a shift of circadian rhythms are needed to explain the benefit on sleep inertia.[74]

A controlled laboratory protocol at 250 units. No advance in melatonin timing compared with dim light. In the same study, twenty minutes of blue light at a nominal hundred units, given two hours after waking with the eyes open, **did** produce a significant advance.[75] Same experiment, same people. The light that worked was the light received while awake.

The fourth study is the one positive result, and it deserves a fair hearing. In a field trial for winter depression, ninety-three minutes of dawn light advanced melatonin timing by about thirty-five

minutes, statistically indistinguishable from thirty minutes of full bright light therapy.[77] That is a real finding in a real trial.

But its own authors record three limitations, and the third is decisive. Light exposure after waking was not controlled, so participants began their day with unmeasured amounts of room light and daylight. Bedroom lighting was likewise uncontrolled. And **the amount of dawn light each participant actually received bore no relationship to the size of their phase shift or to their clinical improvement.**[77] A treatment whose dose does not predict its effect has not established that it is the cause.

Light through closed eyelids can work, at intensities you will never own

To be scrupulous: the pathway is genuinely open during sleep. Researchers have shifted circadian timing through closed eyelids. But look at what it took. One experiment used green light at seventeen to fifty thousand units measured at the eyelid.[80] Another used engineered two-millisecond flashes of intense blue.[81]

These are elegant experiments and they prove a point of principle. They are also one to two orders of magnitude beyond anything on a bedside table.

THE HONEST SUMMARY

A sunrise lamp reliably makes waking easier and less foggy. It does not reset your body clock, the physics of the closed eyelid largely prevents it, and three of the four controlled trials that looked for a shift found none.

Anyone selling you one on the promise of resetting your circadian rhythm is going beyond the evidence.

So why does this book care about it?

Because of a chain that is easy to miss when you are arguing about photons.

The thing that genuinely moves your body clock is real morning light, received with your eyes open, outdoors if possible, in the window after your temperature low. Chapter five established that, and the camping study in chapter three showed how large the available effect is.

The reason most people never get any is not that they disagree. It is that they cannot face being upright and outside at that hour, because the first thirty minutes after a jarring alarm are genuinely awful and the sofa is right there.

The lamp does not move your clock. It gets you upright. Being upright is what gets you into the light that moves your clock.

That is a smaller claim than the one on the box, and it is the one that survives contact with the evidence. It also happens to be the claim that makes the lamp useful, because it puts the device where it belongs: not as the treatment, but as the thing that makes the treatment possible.

Getting the most out of one

If you have a sunrise lamp, or are considering one, the following comes partly from the studies above and partly from what they imply. I have marked which is which, because the distinction matters.

SETTINGS THAT FOLLOW FROM THE EVIDENCE

1. **Give it thirty minutes, not ten.** Every study showing a benefit on sleep inertia used a ramp of thirty minutes or more. A ten-minute ramp has not been tested and is closer to a slow switch than to a dawn. On a lamp offering ten to sixty minutes, such as Aurora, thirty is the evidence-backed setting and sixty is reasonable if you prefer it.
2. **Let it finish at your target waking time, not before.** In the trials the light climbed *towards* the moment of waking. It is the arrival at full brightness that coincides with getting up.
3. **Put it where the light can reach your face.** Bedside table, roughly level with your head, not behind you and not across the room. Given how little passes through an eyelid, losing more to distance and angle is not sensible.

4. **Keep the backup sound.** Do not rely on light alone if you have somewhere to be. In the home study a proportion of people still needed the alarm.

AND THE PART THE LAMP CANNOT DO FOR YOU

1. **Get outside within an hour of getting up.** This is the step that moves the clock, and the lamp exists to make it possible. Twenty minutes is a real dose, because the first minutes count for disproportionately more.
2. **If you cannot get outside, sit by the brightest window you have.** It is worse than outdoors by a wide margin and much better than the room you were in.
3. **Do not use the lamp as a reason to shorten your night.** Nothing in this chapter reduces how much sleep you need.

TWO SITUATIONS WHERE THIS DOES NOT APPLY

If your sleep is severely delayed, meaning you naturally fall asleep in the small hours, re-read the warning at the end of chapter five before adding morning light of any kind. In that situation the light may be landing on the wrong side of the curve.

And if you are waking exhausted because of an untreated sleep disorder, no lamp and no light schedule will touch it. That is chapter four, and it comes first.

WHAT TO TAKE AWAY

- A dawn signal reliably reduces sleep inertia, and improves mood and performance after waking. That evidence is decent.
- It does not reset your circadian clock. Three of four controlled trials found no phase shift, and the fourth could not link the dose to the effect.
- A closed eyelid transmits about 0.3 per cent of blue light and filters towards red, which is the colour your clock cares least about.
- The value of the lamp is that it makes early waking tolerable, and early waking is what gets you into the daylight that does move the clock.
- Use a ramp of at least thirty minutes, finishing at your waking time, and then go outside.

PART II · LIGHT, THE MASTER LEVER

7

Evening light, and the myth you have been sold

Almost everything you have been told about screens and sleep is either exaggerated or aimed at the wrong object. The real culprit is in the ceiling.

There is no subject in this whole field where the gap between what people believe and what has been measured is wider. If you take one chapter from this book to an argument, take this one.

Let me start by admitting that I began it expecting to prove something else. My working assumption was that phones deliver far less light to the eye than a ceiling fixture, and that the entire panic about screens was therefore misdirected. The measurements say otherwise, and I was wrong. What they say instead is more interesting.

How much light a screen actually delivers

Almost nobody quotes the numbers, so here they are.

In the famous experiment that started the panic, participants read on a tablet at maximum brightness, held at a fixed thirty to forty-five centimetres. The light arriving at their eyes was measured at **31.73 lux**.[82] Three commercial smartphones, measured with a spectroradiometer at twenty centimetres and full brightness, delivered between **25 and 58 lux** depending on what was on screen.[87] Typical figures across device classes run to roughly eighty lux for a computer, forty for a tablet, twenty for a phone and ten for a television across a room.[84]

Now the comparison. Researchers put wearable light sensors near the eyes of people in fifty-nine ordinary homes and measured what they actually received in the three hours before bed. The mean was **17.9 units** of biologically weighted light, ranging from 3.9 to 77.4 between households.[88] And when eight adults were asked to

switch on every lamp they owned for four hours, the most they could achieve was about **64 lux**.[89]

So a tablet at reading distance delivers rather more to your eye than the average home evening, and about half of what an aggressively lit house delivers. A screen is not a floodlight. Nor is it negligible. **It is one lamp among several, and it is on for a smaller share of the evening than your ceiling light.**

The finding that should end the argument

Here is the citation that almost never appears in popular writing about screens, and it is the most important one in this chapter.

A systematic review pooled twelve studies that measured sleep properly, with electrodes rather than questionnaires, after evening light exposure. It found **no significant effect of evening light on any sleep outcome.** Sleep latency, sleep efficiency, deep sleep: none of them moved to a degree distinguishable from zero. The average difference in how long people took to fall asleep was **four and a half minutes**.[95]

The same review found that dose-response relationships did appear, but only across an estimated range of one hundred to one thousand biologically weighted units. That is one to two orders of magnitude above what any screen delivers.

I should be careful about how strongly I put this. The confidence intervals in that analysis are wide, which signals large disagreement between studies rather than a confident null. The honest statement is not that evening light has no effect on sleep. It is that **after**

decades of research, the effect has not been reliably demonstrated at the doses ordinary life involves, and that anyone telling you otherwise is ahead of the evidence.

The experts declined to endorse it

In 2024, a sixteen-person expert panel convened by the National Sleep Foundation reviewed 2,209 articles and voted, by a formal consensus method, on what could be affirmed about screens and sleep.

They reached consensus that screen use impairs sleep health in children and adolescents. They reached consensus that the *content* of what people do on screens before bed impairs sleep health.

They **did not** reach consensus that screen use impairs sleep health in adults. And they **did not** reach consensus that the *light* from pre-sleep screen use impairs sleep health, for children, adolescents or adults.[97]

The first author of the celebrated tablet study that launched a thousand articles about blue light sat on that panel. A group including her declined to endorse the light mechanism. That is worth more than any single trial.

What the famous study actually showed

Since it comes up in every conversation, let us look at it properly.

Twelve people spent two weeks living in a laboratory. For five evenings they read on a tablet for four hours before bed; for five others they read a printed book. On tablet evenings their evening melatonin fell by about fifty-five per cent, their melatonin onset

came an hour and a half later, they took about ten minutes longer to fall asleep, they lost about twelve minutes of dream sleep, and they were sleepier the next morning.[82]

Those are real findings from a well-conducted study. Three things are almost always left out.

It involved **twelve people**. The comparison condition was reading a paper book under about **three lux** of ambient light, which is darker than any room you have ever voluntarily sat in, so the contrast is screen versus near-darkness rather than screen versus a normal evening. And the authors themselves write in the paper that, lacking a non-illuminated e-reader condition, their findings may be due to the difference in overall brightness rather than to the colour of the light. In other words, the study most often cited as proof of a blue-light effect does not itself claim to have shown one.

A conceptually similar experiment made one change: participants first had a normal bright day of about 569 lux before their evening of tablet reading. It found **no difference from print reading** in melatonin, sleepiness, sleep latency, sleep architecture or deep-sleep intensity.[85] Fourteen people, so equally small, but it points at something real. What you did during the day changes how much the evening matters.

To be fair in the other direction, a follow-up allowed people to use tablets in the evening however they liked, rather than under instruction. Those participants chose to go to bed **thirty-one minutes later**, and their circadian timing shifted by over an hour relative to print reading.[83] That is a genuine effect and it is the best phase-shift evidence for tablets there is. Note carefully what else it found: **total sleep time did not differ.** They went to bed later and

slept the same amount. The device moved their schedule rather than damaging their sleep, which is precisely the distinction this chapter is built on.

The things people buy

Blue-blocking glasses

A Cochrane review, which is the most stringent form of evidence synthesis, examined seventeen randomised trials covering 619 people. Its conclusion on sleep quality, in its own words, is that it does **not know** whether blue-light filtering lenses are better than ordinary ones, at very low certainty. Three trials found improvement, three found none. The review also recorded adverse effects including increased depressive symptoms, headache and lower mood.[90]

A 2025 meta-analysis pooled the double-blind crossover trials that measured sleep objectively, and found nothing: no effect on how quickly people fell asleep, how long they slept, how efficiently, or how much they woke.[91] Only three trials and forty-nine people, so this is thin in both directions, and I will not claim it proves the glasses do nothing.

What is striking is the pattern across the more favourable analysis. Subjective effects are large. Objective effects are small or absent.[92] That gap, in an intervention that sits on your face in bright orange and cannot possibly be blinded, is the signature of expectation rather than photobiology.

Night mode

Changing a screen's colour without reducing its brightness did not significantly change melatonin suppression in a laboratory test.[93] And in the largest field trial, 167 young adults were randomised for a week to an hour of pre-bed phone use with night mode on, with it off, or with no phone at all. There were no differences between the three groups.[94]

If you like the warmer colour, keep it. It is not doing what the setting implies.

What is actually true, and worth acting on

Having spent several pages taking things away, here is what survives, and it is more useful than what it replaces.

Your living room already exceeds the interesting dose

Chapter five established that half the maximum clock-shifting response obtainable from very bright light can be produced by around one hundred lux, and that half-maximal melatonin suppression occurs below thirty lux at the group level.[67, 68] Your evening lighting is in that range. Your phone is a contributor to it, not a separate category of threat.

Dimming your house genuinely moves your clock

This is the cleanest actionable finding in the chapter. Eight adults spent one week minimising their household lighting for the four hours before bed, and one week maximising it. Their measured

circadian timing was **one hour and three minutes later after the bright week**, and the effect appeared in every single participant.[89]

Eight people is a small study. An effect present in eight out of eight is not a small result.

> AND THE PART THAT KEEPS THIS HONEST
>
> That same study found **no improvement in total sleep time, in wake time during the night, or in when people woke up.** Dimming the lights moved their clock by an hour. It did not make them sleep better that night.
>
> That distinction matters. Evening light control is a tool for *shifting when you are able to sleep*, which is the whole subject of this book. It is not a tool for improving the quality of tonight's sleep, and any book promising you the latter is promising what the trial did not deliver.

Change your bulbs before you change your glasses

Homes lit with LED or fluorescent lamps delivered roughly **ninety per cent more** biologically active light to their occupants' eyes than homes lit with incandescent bulbs.[88] A pair of warm, dim lamps in the rooms you occupy after nine in the evening will do more than any accessory, and costs less.

What you do on the screen matters more than what it emits

The most informative real-world study measured 79 young people across 323 nights with objective screen capture and wrist actigraphy, rather than asking them. Screen time in the two hours

before bed had **essentially no association with sleep**. Screen use once *in bed* was another matter: about three minutes of sleep lost per ten minutes of use, rising to nine minutes for interactive use, seventeen for gaming, and a thirty-five minute loss on nights involving multitasking.[96]

The authors conclude that the association works through time displacement delaying sleep onset, rather than through any direct effect of blue light. Which is to say: the problem was never the photons. It was that a game is more interesting than going to sleep.

A distinction worth carrying

One technical point, because it is the source of a great deal of confusion.

Light acutely *suppresses* melatonin while it is shining. That is a masking effect on the output pathway, and it stops when the light stops. Light can also *shift* the clock itself, which persists into following days. These are different responses with measurably different sensitivities: half-maximal phase shifting at roughly eighty to a hundred and sixty units, half-maximal suppression at roughly fifty to a hundred and thirty.[67]

Suppression is also transient. In adolescents, melatonin suppressed by ninety minutes of unfiltered phone use had **recovered within fifty minutes**, before bedtime.[86]

So when a headline says a device "suppressed melatonin", it is describing something that reverses within the hour. When a study reports a genuine phase shift, measured afterwards in dim light,

that is the finding that matters. Very few articles distinguish the two, and now you can.

What to actually do in the evening

RANKED BY WHAT THE EVIDENCE SUPPORTS

1. **Turn down the room, not the phone.** In the last two to three hours, use lamps rather than ceiling lights, and warm bulbs rather than cool white. This is the intervention with a demonstrated effect on circadian timing.
2. **Get out of bed to use your screen, or do not use it in bed.** The measured harm sits with in-bed use, and with the interactive kind especially.
3. **Choose what you do on it.** Reading is not gaming. The one thing an expert panel agreed on was content, not light.
4. **Get a bright morning and daytime.** The study that found no evening tablet effect had given participants a properly bright day first. Your daytime light history changes how much the evening costs you.
5. **Do not spend money on blue-blocking glasses.** On the current evidence they are, at best, unproven, and the objective trials are null.

WHAT TO TAKE AWAY

- Screens deliver roughly the same order of light to your eye as ordinary room lighting, around twenty to eighty units. They are one lamp among several, not a special category.
- Pooling twelve studies that measured sleep with electrodes, evening light produced no significant effect, with an average sleep-latency difference of four and a half minutes.
- An expert panel in 2024 failed to reach consensus that screen light impairs sleep at any age. It did agree that content does.
- Dimming your household lighting for the four hours before bed shifted circadian timing by an hour in every participant tested, and did not improve sleep that night.
- Blue-blocking glasses and night modes have null or very-low-certainty evidence. Warmer, dimmer bulbs have better support and cost less.

PART III · THE FOUR OTHER LEVERS

8

Temperature, and the number everyone repeats

The bedroom temperature you have been told to aim for has no study behind it. What the research does show is simpler, and points the other way.

Part II was about the master control. This part covers the four levers that work around it: temperature, regularity, what you consume, and what your mind does at eleven at night. They are presented in order of how much the evidence actually supports them, which is not the order in which they are usually discussed.

Temperature comes first because it is among the best-supported, and because almost every popular account of it contains two errors.

Error one: your body does not cool in order to sleep

You have read that your core temperature must fall before you can fall asleep, and that this is why a cool room helps. The temperature fall is real: it begins a couple of hours before habitual bedtime, and when people are allowed to choose their own bedtime they tend to choose the moment when it is falling fastest.

But the causal story attached to it does not hold. A detailed review of the field states the position plainly: body and brain cooling has **not** been shown to initiate deep sleep, and is instead a *consequence* of blood vessels in the skin opening up.[98]

The distinction sounds academic and is not. If cooling caused sleep, the intervention would be to make yourself colder. If cooling is a downstream sign of the body opening its radiators, the intervention is quite different, and in one specific case it is the opposite.

What best predicts how quickly someone falls asleep is not their core temperature but the **gradient between their hands and feet**

and their trunk: warm extremities relative to the body centre. In one laboratory analysis that gradient outperformed both core temperature and melatonin as a predictor.[99] I should flag that this is a two-page brief communication reporting a correlation inside a laboratory protocol, not a randomised warming trial, and the follow-up paper from the same group has a question mark in its title. Treat it as the leading explanation, not a settled one.

Error two: the famous temperature range has no source

Search for the ideal bedroom temperature and you will be told, everywhere, to aim for roughly 16 to 19 °C (60 to 67 °F). I went looking for the study behind that range.

There isn't one. The figure propagates between consumer health sites without a traceable trial underneath it.

The most rigorous field measurement points somewhere warmer. Researchers monitored older adults sleeping in their own homes with wearable sensors and environmental logging, and found sleep was most efficient and least restless between **20 and 25 °C (68 to 77 °F)**, with efficiency falling by five to ten per cent as the room climbed from 25 to 30 °C.[101]

That study is observational rather than randomised, it was conducted in older adults, and the authors emphasise substantial variation between individuals and largely non-linear relationships. So I will not hand you a replacement number to memorise. The honest position is that there is a broad optimum somewhere from

the high teens to the mid twenties Celsius, that it differs between people, and that the specific figure you have been quoted is folklore.

What is actually well established, and it is asymmetric

Here is the finding worth carrying, and it is more useful than any thermostat setting.

Heat exposure reliably increases wakefulness and reduces both deep sleep and dream sleep. Cold exposure does much less damage, because once you have bedding and nightclothes you can compensate for cold and you cannot compensate for heat.[102]

> THE RULE THAT REPLACES THE NUMBER
>
> **Too hot is clearly worse than too cold.** If you are uncertain, err downwards and add a blanket, because a blanket solves cold and nothing in the bed solves heat.
>
> This also explains why summer nights wreck sleep in a way winter nights do not, and why the single most useful bedroom intervention in a hot climate is not a colder thermostat setting but better air movement.

The warm bath, which sounds like folk wisdom and is not

The one temperature intervention with a proper meta-analysis behind it is also the most counter-intuitive: heating yourself up.

A systematic review screened 5,322 articles, retained 17, and pooled data from 13. Warming the body passively in water before

bed shortened the time taken to fall asleep and improved self-rated sleep quality and efficiency. The parameters that worked were specific: water at **40 to 42.5 °C (104 to 108.5 °F)**, for at least **ten minutes**, taken **one to two hours before bed.**[100]

You will find a figure circulating that this cuts sleep onset by about ten minutes. I have deliberately not printed it as a finding, because I could not locate it as a published pooled estimate rather than a sentence in a press release. The timing and the temperature are solid. The precise minutes are not.

The mechanism is the point from earlier in this chapter. A warm bath does not cool you. It opens the blood vessels in your hands and feet, and the heat you then dump through those surfaces produces the steep core temperature fall that accompanies sleep onset. You warm the outside in order to lose heat from the inside. This is why the timing matters: get in too close to bedtime and you are still warm rather than shedding.

Two caveats. The total across all pooled studies is roughly 350 people, and the populations were clinically mixed, including patients with heart disease, cancer and brain injury as well as healthy adults. This is not a clean healthy-adult effect, and it is not a large literature.

Two things sold to you that the evidence does not carry

Socks

You will see the sock study cited confidently. It found that wearing bed socks in a cool room shortened sleep onset by seven and a half minutes and added half an hour of total sleep.

It studied **six people**, all young men, and the participants' own ratings of their sleep showed **no difference at all** between conditions.[103]

I am not telling you to take your socks off. Warming your feet is free, harmless, and follows directly from the vasodilation mechanism, which is the best-supported part of this chapter. Try it. Just do not believe that the numbers attached to it mean anything.

Cooling mattresses

Temperature-controlled mattress covers are expensive and heavily marketed. The most cited study found extra deep sleep and improved cardiovascular recovery, but the research was conducted on a specific commercial device with author affiliations tied to its manufacturer, sleep was measured with a home device rather than laboratory recording, and the effect appeared in men and not in women.[104]

A sex-specific result in a modest sample, from manufacturer-affiliated research, with no independent replication, is not a basis for spending several hundred units of your currency. It may well work. It has not been shown to.

What to do

TEMPERATURE, IN ORDER OF EVIDENCE

1. **Do not sleep hot.** This is the best-supported item in the chapter. If in doubt, run the room cooler and add bedding, because you can fix cold from inside the bed and you cannot fix heat.
2. **Aim broadly, not precisely.** Somewhere between about 18 and 24 °C (65 to 75 °F) is consistent with the field data. Your own comfort is a better guide than any published number, and there is no evidence for the specific range you have been told to hit.
3. **Warm your extremities, do not chill your core.** Warm feet predict fast sleep onset. A cold bedroom with cold feet is the worst of both worlds.
4. **If you like baths, take one one to two hours before bed**, at 40 to 42.5 °C, for at least ten minutes. It is the only temperature intervention here with a meta-analysis behind it.

WHAT TO TAKE AWAY

- Body cooling has not been shown to cause sleep. It is a consequence of blood vessels opening in the skin, which is why warm feet predict fast sleep onset.
- The commonly quoted ideal bedroom temperature has no primary study behind it. The best field data point warmer, around 20 to 25 °C.

- Being too hot is clearly worse than being too cold, because bedding fixes one and not the other.
- A warm bath one to two hours before bed, at 40 to 42.5 °C for ten minutes or more, is the one intervention here supported by a meta-analysis.
- The sock study had six participants and found no subjective difference. Cooling mattress research is manufacturer-affiliated and unreplicated.

PART III · THE FOUR OTHER LEVERS

9

Regularity, which matters more than duration

The largest study of its kind found that when you sleep predicts your health better than how long you sleep. The number everyone quotes from it is the wrong one.

Chapter one spent several pages taking apart the eight-hour rule. This chapter provides the thing that replaces it, and it is the closest this book comes to a single instruction.

Researchers took 60,977 people, fitted them with accelerometers, gathered more than ten million hours of recorded sleep, and followed them for years. They compared two ways of describing someone's sleep: how much of it they got, and how consistently they got it at the same time.

Consistency was the better predictor of dying.[105]

The measure they used was developed a few years earlier, on sixty-one students tracked for a month. It does something simple and clever: rather than asking how many hours you slept, it asks how likely you are to be in the same state, asleep or awake, at the same clock time on any two days. Even in that small original study, the students with the most irregular patterns had measurably later circadian timing and worse academic results, independently of how long they slept.[108]

And now the correction

You may have seen this study reported with a figure of up to forty-eight per cent lower mortality risk. That number is real, and it comes from the minimally adjusted model. Once the analysis accounts for the obvious confounders, the range falls to roughly **twenty to thirty per cent**. That is the figure this book uses, and the one you should quote.

Two further honesties. This is an observational study, so it cannot establish that irregular sleep causes harm rather than accompanying it, and undiagnosed illness produces irregular sleep.

And "stronger predictor" is a statement about which model fits the data better, not a demonstration that duration is irrelevant.

The asymmetry that changes the instruction

A second analysis of the same cohort, covering 88,975 people, found the relationship is not a straight line, and the shape of the curve matters more than its existence.

Compared with a median sleeper, someone in the most irregular five per cent carried a substantially raised risk. Someone in the most regular five per cent carried a benefit that was smaller, and whose confidence interval touched no effect at all.[106]

Read that as an instruction and it says something specific. **The gain is in avoiding chaos, not in achieving precision.** Moving from wildly irregular to reasonably consistent is where the value sits. Moving from reasonably consistent to metronomic buys you very little, and is not worth organising your life around.

This is the opposite of how sleep-tracking apps present it, and it is a relief.

The result that separates timing from quantity

The mortality finding is impressive but blunt. The study that actually isolates the mechanism is a different one, and it is the best evidence in this chapter for the argument of the whole book.

Nearly eighty thousand people free of depression and anxiety at the start were followed for a median of seven and a half years.

Regular sleepers had markedly lower rates of both conditions than irregular sleepers. That much is unsurprising.

Here is the part that is not. Among people whose sleep was irregular **but who did meet the duration guidelines**, risk remained elevated: roughly forty-eight per cent higher for depression.[107]

Sleeping the recommended number of hours did not protect them. The hours were right and the timing was not, and the timing was where the association lived. That subgroup is the closest thing the literature offers to a direct test of this book's argument.

The usual caveats apply, and I would rather state them than have you find them: same biobank, one week of measurement, healthy-volunteer selection, and prodromal depression itself disrupts sleep timing, so reverse causation is entirely plausible.

Why the method anchors your waking time

The protocol in Part V asks you to fix when you get up, and to let bedtime follow. Here is the reasoning, and then here is the admission.

The reasoning is sound. Sleep pressure builds from the moment you wake. If you rise at the same time regardless of how the night went, that pressure accumulates over a predictable number of hours and arrives at a predictable strength in the evening, which is what makes the following night fall into place. If instead you sleep in after a bad night, you shorten the day, arrive at bedtime under-pressured, lie awake, and reproduce the problem. Fixing the rise time is also the lever you actually control: you can decide when your alarm goes off, and you cannot decide when you fall asleep.

This is why clinical protocols for insomnia set a fixed rise time first and let bedtime float.[61]

> THE ADMISSION
>
> I could find **no trial that has ever compared anchoring wake time against anchoring bedtime.** The reasoning above is standard clinical practice and it is mechanistically coherent, but it is reasoning rather than a result. If someone tells you it has been proven, they have not looked.
>
> I am telling you this because the method in Part V rests on it, and because a book that grades its own evidence has to grade the parts it depends on too.

Can you repay the debt at the weekend?

This is the question everyone actually wants answered, and the literature gives two different answers depending on what you measure.

The laboratory says no. In a controlled experiment, one group was sleep-restricted during the week with no recovery, another was restricted and then allowed to sleep freely at the weekend. Whole-body insulin sensitivity fell in the restricted group. In the weekend-recovery group it fell too, and by some measures further. Both restricted groups ate more after dinner, gained weight, and had their circadian timing pushed later.[111]

That result is often reported as "catching up makes it worse". Before you accept that, note the size: thirty-six people in total, split into arms of eight to fourteen, over ten days.

The population data say something different. A cohort of more than 43,000 adults followed for thirteen years found that people under sixty-five who slept short on weekdays but long at weekends had mortality **no different** from consistent seven-hour sleepers. Those who slept short consistently, with no weekend recovery, carried substantially higher mortality.[112]

These findings are not actually in contradiction. They measure different things over different timescales: metabolic markers over ten days in a laboratory, versus deaths over thirteen years in a population. What they jointly rule out is the confident slogan.

> THE HONEST ANSWER
>
> Weekend recovery sleep does not undo the metabolic effects of weekday restriction under controlled conditions. At the scale of a life, it does not appear to carry the excess mortality that chronic short sleep does.
>
> So sleep in if you need to. It is better than not sleeping in. It is worse than not needing to, and the cost you can measure is that it drags your clock later and makes Monday harder, which is precisely the mechanism chapter three described.

Naps

Naps have a reputation problem in sleep books, which usually forbid them. The evidence supports something more specific than a ban.

In a study comparing naps of five, ten, twenty and thirty minutes against no nap, after a night cut to about five hours, **the ten-minute nap was the clear winner**. It improved sleepiness, fatigue, vigour

and cognitive performance immediately, with benefits that persisted for over two and a half hours. The thirty-minute nap produced a period of impaired alertness first, and only delivered benefits after that had cleared.[109]

That impairment is sleep inertia, the same phenomenon as chapter two, arriving in the afternoon. A longer nap lets you descend into deeper sleep, and you pay for the return journey.

Two limits worth knowing. The study used twenty-four healthy young adults who were not habitual nappers, and it did not measure the following night, so it cannot tell you whether napping costs you sleep later. And after any nap, your own sense of whether you have recovered is unreliable, as it is in the morning.[12]

On the standard advice never to nap if you sleep badly, there is now a randomised pilot in which people undergoing insomnia treatment were permitted to nap. Their treatment outcomes were **not** blunted.[110] One pilot does not overturn clinical convention, but it makes the blanket prohibition look less certain than it is usually stated.

What to do

REGULARITY, IN ORDER OF EVIDENCE

1. **Attack the chaos, not the last ten minutes.** The measurable benefit lies in moving from wildly irregular to broadly consistent. Precision beyond that is not supported and is not worth the anxiety.

2. **Anchor the morning.** Fix your rise time and let bedtime follow. This is clinical convention with sound reasoning behind it rather than a tested finding, and it is the lever you can actually operate.
3. **Cap the weekend drift.** If your free-day wake time is more than about an hour later than your work-day wake time, that gap is what makes Monday morning feel the way it does. Shrinking it is worth more than any other single change in this chapter.
4. **Nap for ten minutes, not thirty.** And set an alarm, because your judgement of when to stop is not reliable.

WHAT TO TAKE AWAY

- In 60,977 people, how consistently you sleep predicted mortality better than how long you sleep. The fully adjusted benefit is twenty to thirty per cent, not the forty-eight per cent widely quoted.
- The relationship is asymmetric. Avoiding chaos is where the value is; optimising towards perfection is not.
- Irregular sleepers who did meet duration guidelines still carried elevated depression risk. Hours right, timing wrong, still a problem.
- Anchoring wake time rather than bedtime has never been tested head to head. It is sound reasoning, and this book depends on it.
- Weekend catch-up does not repair metabolic markers in the laboratory, but does not carry the mortality risk of chronic short sleep in populations. It also drags your clock later.

PART III · THE FOUR OTHER LEVERS

10

Coffee, alcohol, and dinner

Three habits, three completely different qualities of evidence, and the one people worry about least is the one with the strongest case against it.

Most advice about what to consume before bed arrives with the same confident tone regardless of what is behind it. In fact these three subjects sit at three very different levels of certainty, and the ranking is not the one you would guess.

Alcohol has the strongest evidence and gets the mildest advice. Caffeine has excellent underlying pharmacology and one famously weak trial. Late meals have almost nothing, and get lectured about constantly.

Alcohol, which is worse and different than you were told

Chapter four introduced the correction. Here is the full picture.

A meta-analysis pooled twenty-seven studies of alcohol and subsequent sleep in healthy adults. Its central finding is a dose-response relationship, and the doses matter enormously.[44]

Dream sleep is cut and pushed later at doses as low as two standard drinks. Not five. Not "heavy drinking". Two. And the effect grows with the dose from there.

Meanwhile the thing everybody repeats, that alcohol fragments the second half of the night, was *not* confirmed when the studies were pooled: the effects on wakefulness during the night carried large uncertainty. That claim comes from a narrative review with no pooled estimates, and it has been copied from book to book ever since.

And the reason people drink before bed in the first place, the sedative head start, only appeared at around five drinks. At a dose,

in other words, that is doing other damage.

> **WHAT THIS ACTUALLY MEANS AT YOUR DINNER TABLE**
>
> Two glasses of wine is already the dose at which measured effects appear. There is no threshold below which you are safe and above which you are not; there is a slope, and you are already on it.
>
> It also means the common compromise, "I'll have my drink earlier in the evening so it's out of my system", is aimed at the wrong mechanism. The effect being measured is on the structure of your sleep, not on residual blood alcohol at bedtime.

I will not tell you not to drink. I will tell you that if you drink most evenings and wake unrefreshed most mornings, this is the single best-evidenced connection in this entire book, and the cheapest experiment available to you is two weeks without it.

Caffeine, where the pharmacology beats the trial

Everyone knows the rule about not drinking coffee after some hour of the afternoon. Almost nobody knows that it rests on twelve people.

The famous study

Participants took 400 milligrams of caffeine, roughly four cups of coffee, delivered as a pill, at bedtime, three hours before bed, and six hours before bed. All three conditions measurably reduced total

sleep time, by something in the region of an hour, compared with placebo.[113]

Now the caveats, which are rarely travelled with.

Twelve participants. Sleep measured not with laboratory electrodes but with a consumer sleep headband. And most tellingly: at the six-hour mark, **only the device detected a difference. The participants' own sleep diaries did not.** The authors state this plainly, and the diary result at six hours did not reach significance.

So the honest version is this. In twelve people, four cups' worth of caffeine taken six hours before bed measurably changed headband-recorded sleep, and the people it happened to could not tell. That is genuinely interesting. It is not "your afternoon coffee costs you an hour of sleep", which is what it has become.

What is actually solid

The pharmacology, which nobody disputes, is the better guide.

Caffeine is cleared from your body slowly, with a half-life in healthy adults conventionally given as a range of a few hours rather than a single figure, and with a population spread extending far wider at both ends.[115] Around ninety-five per cent of that clearance runs through a single liver enzyme, and variation in the gene for that enzyme is the main reason people differ so much.[114]

Several things reliably change your personal number, and here I will give directions rather than multipliers, because the multipliers circulating in popular writing could not be verified against primary sources. **Smoking speeds clearance up considerably. Hormonal contraceptives slow it down substantially. Pregnancy slows it a**

great deal, most of all late on. If any of those apply to you, the general advice is not calibrated for you.

DO THE ARITHMETIC INSTEAD OF FOLLOWING THE RULE

1. Take your afternoon coffee's caffeine as a starting quantity.
2. Halve it for every few hours that pass. This is arithmetic from the half-life, not a study finding, and your own half-life may be well outside the average.
3. A coffee at four in the afternoon therefore leaves a substantial fraction still circulating at bedtime, and a smaller but real fraction in the middle of the night.
4. The useful conclusion is not a fixed cutoff hour. It is that caffeine is still present far later than it feels present, and that the feeling of it wearing off is not the same as it being gone.

And one more finding worth carrying, because it recurs throughout this book: in the caffeine trial, as in the sleep restriction studies of chapter one, people were affected without noticing. Your subjective sense of whether something is disturbing your sleep is the least reliable instrument you own.

Dinner, which is lectured about on almost no evidence

Here is a case where I expected to find a solid case and did not.

The claim that eating late damages your sleep is everywhere. What supports it, specifically for sleep rather than for metabolism, is thin.

The main citation is a survey of 793 students, in which eating within three hours of bedtime was associated with waking during the night. Note what it was *not* associated with: taking longer to fall asleep, or sleeping less.[116] It is cross-sectional and self-reported, so it can show a pattern and nothing more.

The controlled test is more damaging to the claim. Twenty healthy adults ate dinner either one hour or five hours before bed, and had their sleep recorded properly with electrodes. **Sleep stages were essentially the same between conditions.** Only small differences in the electrical texture of sleep appeared, and they faded across the night.[117]

So the honest position is that the case against late eating is strong for your metabolism and for your peripheral body clocks, as chapter three described when meals shifted the rhythm of blood glucose by nearly five hours while leaving central timing untouched.[38] The case that a late dinner will worsen tonight's sleep is weak.

There are still good reasons not to eat immediately before lying down, including reflux, which is a genuine and common cause of the fragmented sleep described in chapter four. But that is a specific mechanism in specific people, not a general rule about sleep quality.

What to do

RANKED BY THE STRENGTH OF THE EVIDENCE, NOT BY HOW

OFTEN YOU HEAR IT

1. **Alcohol first.** Best evidence in the chapter by a wide margin, effects from two drinks, and it is the variable most people are least willing to examine. If you change one thing here, change this.
2. **Caffeine second, but think in half-lives rather than deadlines.** There is no magic hour. There is a substance that is still in you long after it stopped feeling like it, in an amount that varies enormously between people.
3. **Dinner timing last.** Worth attention for your metabolism and if you get reflux. Not worth anxiety for your sleep, because the controlled test found essentially nothing.
4. **And test on yourself.** Given the fifty-fold variation in light sensitivity from chapter five and the wide variation in caffeine clearance here, the population average is a starting hypothesis about you, not a fact about you.

WHAT TO TAKE AWAY

- Alcohol cuts and delays dream sleep from two standard drinks. The fragmentation claim everyone repeats was not confirmed when studies were pooled, and the sedative effect needs about five drinks.
- The famous caffeine timing study involved twelve people and a consumer headband, and at six hours before bed the participants themselves could not detect the effect the device measured.

- Caffeine clearance varies enormously between people, mostly through one liver enzyme. Smoking speeds it up; hormonal contraceptives and pregnancy slow it considerably.
- The evidence that late dinners harm sleep is weak. A controlled study with electrodes found sleep stages essentially unchanged between eating one hour and five hours before bed.
- In both the caffeine and the sleep restriction literature, people were measurably affected and could not tell. Your own impression is the weakest instrument available.

PART III · THE FOUR OTHER LEVERS

11

The mind that will not switch off

We know with reasonable confidence what stops people falling asleep. We know very little about how to stop it, and the most popular remedy has the weakest evidence in this book.

This chapter has an unusual shape, and I want to warn you about it before you start. The mechanism is well established. Every technique derived from it is thinly evidenced. That combination is uncomfortable to write about honestly, and most books resolve the discomfort by pretending the second half is as solid as the first.

It is your head, not your body

You have felt this. You are exhausted, your limbs are heavy, you got into bed genuinely wanting to sleep, and your mind is running the events of the day, or tomorrow's, at full speed. The tiredness is real and completely irrelevant.

That observation has been tested directly. Researchers gave volunteers thirty minutes of cognitive tasks before bed, deliberately chosen to be mentally demanding *without* being emotionally upsetting and without raising the body's physical arousal. Objectively measured sleep onset was significantly prolonged, and the electrical signature of a busy brain persisted into the early deep sleep periods.[118]

Fifteen people, so hold the details lightly. But the finding sits on top of a much older experiment showing that deliberately increasing worry in good sleepers lengthens the time they take to fall asleep,[119] and on a body of work concluding that cognitive arousal is a far better validated concept in insomnia than physical arousal is.[120] There is even a standard instrument for measuring the two separately, and it is the cognitive half that carries the predictive weight.[121]

WHY THIS MATTERS MORE THAN IT SOUNDS

If what blocks sleep is mental activity rather than bodily tension, then a large category of popular advice is aimed at the wrong target. Physical relaxation, hot baths, muscle tensing routines and breathing exercises all address the body. The body was rarely the problem.

It also explains the most maddening feature of a bad night: that trying harder makes it worse. Effort is cognitive activity. Attempting to fall asleep is, mechanically, one more reason not to.

Now the uncomfortable part

Having established the mechanism reasonably well, the field has produced remarkably little that reliably fixes it. I am going to go through the options in descending order of evidence, which means starting with the one that has any.

Writing a to-do list

The best-designed study in this chapter is also the most charming. Participants spent five minutes before bed either writing a list of things they still had to do, or writing about things they had already completed. Sleep was recorded properly, with electrodes.

The to-do list group fell asleep in **15.8 minutes** against **25.1 minutes** for the completed-tasks group, a difference with a moderate effect size. More specific lists produced faster sleep onset; more specific completed-activity lists produced the opposite.[122]

Three caveats, and the third is the one that matters. Fifty-seven healthy young adults. A single night. And it was their *first* night in a sleep laboratory, which reliably inflates how long everyone takes to fall asleep and therefore leaves unusual room for improvement. Note also what the comparison was: another writing task, not doing nothing. The study shows that listing tomorrow beats reminiscing about today. It does not show that writing beats not writing.

I found no replication. It is an elegant, plausible, single, unreplicated study, and it is still the best thing in this chapter.

Worry scheduling

The technique, sometimes called constructive worry, is to sit down a couple of hours before bed and write your worries in one column with a matched practical next step in the other. The idea is to complete the mental business before you are horizontal.

It has been tested, in small trials.[124] The most informative one compared it against imagery distraction and against a gratitude exercise. All three reduced pre-sleep arousal and improved reported sleep. **No technique outperformed any other, and there was no inert control condition.**[123]

Read honestly, that is not evidence for constructive worry. It is evidence that doing something structured with your mind before bed helps, and that it does not much matter which structured thing. That is a perfectly reasonable thing to recommend. It is not a mechanism, and it should not be sold as one.

Mindfulness, which is the most popular and the least supported

This is where I expect to lose some readers, so let me be precise rather than dismissive.

Mindfulness meditation does improve self-reported sleep quality compared with active control conditions. The pooled effect size is **0.33**, which in this field means small.[126]

But the headline promise, the one people actually want, is falling asleep faster. A meta-analysis of randomised trials in insomnia specifically found **no significant effect on how long people took to fall asleep** in its primary analysis. Effects appeared for total wake time, sleep efficiency and overall quality, but the sleep-onset result, the one that would matter to someone lying awake, was not there. Significance appeared only in subgroup analyses, which is a well-known warning sign.[125]

And when the American Academy of Sleep Medicine reviewed the behavioural treatments for chronic insomnia, it made **no recommendation at all** on mindfulness, along with cognitive therapy alone, paradoxical intention and biofeedback, largely because too few studies existed for each. Relaxation therapy as a single component received a *conditional*, meaning weak, recommendation. Only multicomponent cognitive behavioural therapy received a strong one.[61]

If mindfulness helps you, keep doing it. It is free, safe and pleasant. Just know that its popularity in sleep advice is enormously out of proportion to what has been shown.

Breathing patterns

You will have encountered a numbered breathing technique, presented with great confidence and a specific count. I went looking for the evidence and found none worth the name: no objective measurement of sleep onset, no replication, no synthesis, and an origin outside the research literature entirely.

It may work for you. Slow breathing is calming and costs nothing. But it belongs in the category of plausible folk practice, and any book that presents it as a research finding is inventing a pedigree it does not have.

What this chapter can honestly offer

Given all that, here is what I would actually do, ordered by how much is behind it.

FOR THE MIND THAT WILL NOT STOP

1. **Write tomorrow down, before you get into bed.** Five minutes, specific rather than vague. One good randomised study with electrodes, no replication, and the best evidence here.
2. **Do something structured with your mind in the hour before bed, and it matters less which.** Worries with next steps, a gratitude list, deliberate imagery: they performed equivalently. Pick the one you will actually do.

3. **Stop trying to sleep.** Effort is cognitive arousal, which is the thing that is keeping you awake. This follows from the mechanism rather than from a trial, and it is the reason the classic instruction is to get up and leave the bedroom rather than lie there working at it.
4. **Do not expect the physical remedies to solve a mental problem.** The bath in chapter eight is worth doing for its thermal effect. It is not a treatment for a racing mind.
5. **If this is your main problem and it is chronic, the answer is a real treatment.** Cognitive behavioural therapy for insomnia is the recommended first line, at the strongest grade, and it is the only thing in this area with that standing.

Closing Part III

You now have the four levers that work around the light. In order of how much the evidence supports them: avoid alcohol close to bed, do not sleep hot, protect the regularity of your schedule, and give your mind somewhere to put itself before you lie down.

None of them will do very much on their own. That is not a failure of the levers; it is the reason this book put light first and them second. What remains is to turn all of it into a sequence you can actually follow, and to fit that sequence to the particular person you are, which is where the last two parts come in.

WHAT TO TAKE AWAY

- What blocks sleep onset is mental activity, not physical tiredness. This has been shown by deliberately inducing cognitive load without emotional or bodily arousal.
- Trying harder to sleep is itself cognitive arousal, which is why effort makes it worse.
- The best-evidenced technique here is writing a to-do list before bed: one randomised study with electrodes, fifty-seven people, one night, no replication.
- When constructive worry, imagery and gratitude were compared, none outperformed any other and there was no inert control. Doing something structured seems to matter more than which thing.
- Mindfulness has a small effect on sleep quality and no significant effect on sleep onset in the primary analysis. The relevant professional body declined to recommend it either way.

PART IV · MAKING IT YOURS

12

Your chronotype, and the lives this book does not fit

One number tells you most of what you need to know about your own timing, and you already have it. This chapter also covers the situations where the advice so far would be wrong.

Everything so far has been written for someone with a broadly ordinary life: awake in the day, asleep at night, in control of roughly when. This chapter does two things. It tells you where you personally sit on the one dimension that matters, and it deals with the lives the previous chapters do not describe.

What chronotype actually is

Chapter three established that your clock runs at about 24.15 hours and has to be reset daily. Chronotype is where that resetting leaves you: the position your clock settles into, relative to the sun and to everybody else's.

It is not a personality trait, and it is measurable in tissue rather than in temperament. Chapter one gave the figure that makes this concrete: the low point of core body temperature falls at 3.50 in the morning in morning types but at **6.01** in evening types.[9] Two hours of biological difference between two people who both have to be somewhere at nine.

Part of it is inherited, and part of it is sex-linked in a small but measurable way: in the largest sample assembled, women's intrinsic period ran about six minutes shorter than men's, with roughly 35 per cent of women below twenty-four hours against 14 per cent of men.[34] Part of it is also plastic, as chapter three's finding on prior schedule showed.[35]

A note on the four animals

You may have met a scheme sorting people into four animal types. I looked for peer-reviewed validation of those categories and did not find any.

What the validated instruments actually produce is a *continuous* score along a single dimension from early to late, not a set of discrete kinds. That distinction matters for a practical reason rather than a pedantic one: on a continuum, you can move, and the question becomes how far in which direction. In a system of four types, you are a wolf, and there is nothing to be done about it except buy something.

Finding your own position, without a questionnaire

There are two well-validated chronotype questionnaires. Neither appears in this book, and the reason is the same one that kept the sleep apnoea screening tool out of chapter four: both are copyrighted, and neither can be reproduced in a book you paid nothing for but which was published commercially. Requesting permission would have been possible; printing them without it would not.

Fortunately the core of the better one is a single piece of arithmetic, and arithmetic is not anybody's property.

YOUR MID-SLEEP ON FREE DAYS

1. Think of days with **no alarm and no obligation**: a holiday, or a run of free days, ignoring the first two or three while you repay sleep debt.
2. What time do you fall asleep, and what time do you wake naturally?
3. Take the midpoint between them. Asleep at midnight, awake at eight, gives a mid-sleep of four in the morning.
4. Earlier than about 3.30 puts you towards the early end. Later than about 5.00 puts you towards the late end. In between is where most people are.

That midpoint is the measure underlying the concept of social jetlag from chapter three,[41] and comparing it with your mid-sleep on working days gives you the gap that the method in Part V is designed to close.

Two cautions. This is a self-estimate, not a clinical assessment. And the researcher who developed the underlying instrument has himself published a review conceding that the measure may be too simplistic and that most of the health associations built on it are correlational.[42] Use it to locate yourself roughly, not to diagnose yourself.

How much can you actually change it?

Less than the self-help genre implies and more than the fatalists claim.

The honest bounds come from two studies already in this book. On the optimistic side, a week of camping with no electric light moved people's clocks so that biological night began at sunset, and the late types moved the most.[39] On the realistic side, that was seven days of an environment none of us live in.

What you can expect from the method in Part V is a shift of an hour or two, achieved over weeks, and held only as long as you keep supplying the morning light and protecting the regularity. Your underlying tendency does not disappear. You are moving where your clock sits, not what it is.

The lives this book does not fit

If you work nights or rotating shifts

This is the situation where I have to be most careful, because the popular literature is confident and the evidence is not.

Two systematic reviews cover this. One examined seventeen randomised trials of personal, non-drug interventions and concluded that, given the diversity of the studies and the very low to low quality of their evidence, **it is not possible to determine whether shift workers' sleepiness can be reduced or their sleep improved.**[127] Seventeen trials, 556 people in total, an average of about thirty-three per trial.

The other examined shift schedules themselves. Forward rotation may reduce sleepiness during shifts, but the certainty was rated very low, and it made no difference to sleep quality. The only finding to reach moderate certainty in the entire review was that limiting shifts to sixteen hours produces a *minimal* reduction in sleepiness.[128]

And the studies most often cited as proof that night workers can adapt with timed light deserve a specific correction. The landmark demonstration involved **eight men in a laboratory** under total environmental control.[129] The influential later work on shifting to a compromise position was also a laboratory simulation, with volunteers who, in the authors' own words, worked in the lab and slept at home.[130] These are real results about the human circadian system. They are not field trials of employed night workers, and they are routinely presented as if they were.

WHAT I WOULD ACTUALLY TELL A NIGHT WORKER

The one intervention here with a randomised trial in a real workplace is the **planned nap**. In emergency physicians and nurses working genuine night shifts, a forty-minute nap opportunity at three in the morning reduced performance lapses, fatigue and sleepiness by the end of the shift.[131]

But read the same trial's two other findings, because they are the ones nobody quotes. Memory was measurably *worse* immediately after waking, which is the sleep inertia of chapter two arriving in the middle of a night shift. And the nap group did **not** perform any better than the others on a simulated drive home.

Two more things worth knowing. Amber glasses worn on the commute home are mechanistically sensible, cheap and harmless, and the evidence for them is one uncontrolled pilot in twenty-eight postal workers,[132] followed by a larger and better-designed crossover trial from the same research group that found **no benefit**.[133] Worth trying, not established.

And if you cannot get one long block of sleep, the largest laboratory study of split schedules found that performance and sleepiness were primarily a function of **total time in bed per twenty-four hours**, regardless of how it was divided.[134] That is genuinely reassuring: two blocks totalling seven hours is not obviously worse than one.

> THE THING NO INTERVENTION HAS BEEN SHOWN TO DO
>
> No intervention of any kind, drug or otherwise, has been shown in a systematic review to reduce actual injuries in shift workers. Not because the trials failed, but because the trials have never measured injuries at all. A review of caffeine in shift workers examined thirteen randomised trials and found that **none of them measured an injury outcome**.[135]
>
> So if you are driving home after a night shift, treat that as a hazard that this book cannot help with, and one that no amount of light, napping or scheduling has been demonstrated to fix.

If you are past sixty-five

Your clock has probably moved earlier, and the gap between your temperature low and your waking time has narrowed: from about

three hours eighteen in young morning types down to roughly an hour and a half in older ones.[17]

The practical consequence is that you are waking closer to your biological low point than you used to, which is part of why early waking becomes both more common and less refreshing with age. The method in Part V still applies, but if your complaint is waking too early rather than too late, you want the opposite of the light schedule this book has described. That inversion is worth discussing with a doctor rather than improvising.

If you have a baby, or anyone else who wakes you

Almost nothing in Part V is available to you, and I would rather say so than pretend otherwise. A fixed rise time is not yours to choose.

Keep one component: get outdoor light whenever you are first properly up, however ragged the night was. It is the only element of the method that still functions when the schedule is not under your control, and it costs nothing you have.

WHAT TO TAKE AWAY

- Chronotype is a position on a continuum, not a type. The validated instruments produce a continuous score, and the popular four-category schemes have no validation I could find.
- Your mid-sleep on free days, the midpoint between falling asleep and waking with no alarm, locates you well enough for this book's purposes.
- You can move where your clock sits by an hour or two over weeks, and only while you keep supplying the conditions. You do not change what it is.

- For shift workers, the evidence is far weaker than the confident advice suggests. The planned nap is the one intervention with a randomised trial in a real workplace, and even it did not improve the drive home.
- If you are woken by a child, keep the morning light and let the rest go.

PART V · THE TWENTY-ONE DAYS

13

How the method works, and why it is three weeks

Not because habits take twenty-one days to form. That is a myth. The real reason is arithmetic, and it sets the ceiling on how fast any of this can go.

Everything in this book so far has been description. This part is instruction, and before you start following it you are owed an account of why it is shaped the way it is, including the parts of it that rest on reasoning rather than on trials.

Why twenty-one days

You have heard that it takes twenty-one days to form a habit. That claim traces to a plastic surgeon's observation in the 1960s about how long patients took to adjust to their new faces, and it has no basis as a general law of behaviour. This method does not use it.

The real reason is a limit on how fast a circadian clock can move.

Chapter five established that a single episode of bright light, even a long one at high intensity, buys you at most a few hours of shift, and that the practical amount available from a realistic morning exposure is considerably less. A clock does not jump. It walks, and the walk has a maximum pace of roughly an hour a day under ideal laboratory conditions, and rather less than that in a real life containing weekends, weather and other people.

So the arithmetic is this. If your body clock is two hours later than your obligations require, and you can realistically move it fifteen to thirty minutes at a time with a few days of consolidation between moves, you need something on the order of two weeks of shifting plus a week of holding. That is where three weeks comes from. It is a consequence, not a slogan.

IF YOUR GAP IS SMALLER, YOU FINISH SOONER

Someone whose free-day wake time is only forty minutes later than their workday wake time has a much smaller correction to make and may be done in ten days. Someone with a four-hour gap will need longer than three weeks, and should move more slowly rather than trying to compress it.

The three weeks are a structure, not a deadline.

What this method deliberately does not do

Three omissions are deliberate, and each one is a case where the popular version of this advice is either unsupported or unsafe.

It does not restrict your sleep

The standard clinical treatment for insomnia includes sleep restriction: deliberately cutting time in bed to build sleep pressure. It works, and it is part of the first-line therapy this book has recommended twice.

It is also not something to do from a book. In a study that measured what happens during the first weeks of sleep restriction therapy, total sleep time fell, daytime sleepiness rose significantly across the first three weeks, and objectively measured vigilance was impaired at several points.[136] The authors state the obvious implication: this has consequences for how the treatment should be safely delivered.

Delivered by a clinician who is monitoring you, that temporary cost is managed. Delivered by a book to a stranger who may drive to

work, it is not. So this method builds sleep pressure by fixing your rise time and letting your bedtime find its own level, and never by taking sleep away from you.

It is not a sleep hygiene list

Chapter four quoted the recommendation that clinicians should *not* use sleep hygiene as a single-component therapy for chronic insomnia.[61] Dark room, cool room, no screens, no late coffee: useful ingredients, not a treatment.

What distinguishes this method from that list is that it has a mechanism and a sequence. It works on one thing, the timing of your clock, using the one input that reliably moves it, and it does the other things only in the order and at the moment they support that.

It anchors your morning, and I have told you why that is reasoning rather than proof

Chapter nine set this out and I will not repeat it, except for the one line that matters: no trial has compared anchoring wake time against anchoring bedtime.[61] The reasoning is sound and it is standard clinical practice. It remains reasoning.

The four rules

Everything in the next three chapters is an application of four rules, and if you remember nothing else, remember these.

THE RULES

1. **The rise time is fixed. Everything else is negotiable.** Same time every day including weekends, within an hour at the very worst. This is the anchor the whole method hangs from.
2. **Light in the morning, dark in the evening, in that order of importance.** Morning light is the active ingredient. Evening dimness is the supporting one. A perfect evening with no morning light achieves very little.
3. **Move slowly, and hold.** Fifteen to thirty minutes at a time, then two or three days at the new time before moving again. Faster is not braver, it simply fails.
4. **Measure, because your impression is unreliable.** Chapters one, ten and eleven all found the same thing: people are measurably affected and cannot tell. A one-line daily log beats your memory of the week.

What you need before you start

Very little, and none of it is a purchase.

BEFORE DAY ONE

1. **Do the chapter four assessment** if you have not. If your answer was cause five or six, medical or medication, stop here and make an appointment. The method will still be here afterwards.

2. **Find your two wake times.** The time you get up for work, and the time you wake without an alarm on a free day after a few days of holiday. The gap between them is the size of your problem, and it is the single most useful number you will produce.
3. **Decide your target rise time.** For week one this is your *current* workday wake time, not an aspirational earlier one. You are anchoring first, and only moving later.
4. **Work out where you can get twenty minutes of outdoor light** within an hour of getting up. A walk, a balcony, a bus stop, a coffee outside. This is the step everything else serves.
5. **Get something to write one line a day on.** Paper is fine and probably better.

ONE SITUATION WHERE YOU MUST NOT START HERE

If you naturally fall asleep in the small hours and are being forced up hours before your body intends, adding bright morning light can land on the delaying side of the phase response curve and push your clock further late, as chapter five explained.

Do not begin with light. Begin by moving your rise time later to meet your body, stabilise there, and then walk it earlier fifteen minutes at a time. If the gap is more than three hours, this is worth discussing with a doctor rather than attempting alone.

WHAT TO TAKE AWAY

- Three weeks comes from how fast a circadian clock can move, not from the twenty-one-day habit myth.

- The method contains no sleep restriction, because that technique measurably impairs vigilance in its first weeks and is not safe to self-administer.
- It is not a hygiene list. It works on the timing of the clock, in sequence, using the input that moves it.
- Four rules: fix the rise time, light in the morning before darkness in the evening, move slowly and hold, and measure rather than remember.
- Your starting number is the gap between your workday wake time and your free-day wake time.

PART V · THE TWENTY-ONE DAYS

14

Week one: stop moving

You will change one thing and measure two. The instruction not to fix everything at once is the most important one in this chapter.

The temptation in week one is to do everything. Cut the coffee, bin the wine, dim the lamps, buy the sheets, start the meditation. Resist it, for a reason that is practical rather than moral: if you change eight things and something improves, you have learned nothing about yourself, and chapter ten established that individual variation in this field is enormous.

Week one has exactly one intervention and one measurement. Its purpose is to give the following two weeks something stable to push against.

The one thing you change

You get up at the same time every day, and you get light into your eyes within an hour.

That is the whole intervention. Same time seven days, including the weekend, which is where most people fail. Then outdoors, or at the brightest window you have, for twenty minutes or more.

Twenty minutes is not a token. Chapter five established that the relationship between duration and effect is strongly non-linear, and that the first minutes of an exposure do a disproportionate share of the work.[65] Outdoors on an overcast morning is roughly thirty times brighter than a well-lit room, and your eyes will not tell you that.

IF A SUNRISE LAMP IS WHAT GETS YOU UPRIGHT

Set the ramp to thirty minutes or more, finishing at your target rise time, positioned where the light reaches your face, and keep the sound as backup. Chapter six set out both what that does and what it does not do.

Then go outside. The lamp's job in this method is to make step one survivable. The daylight is what does the work.

The two things you measure

One line a day, written in the morning, taking under thirty seconds.

YOUR DAILY LINE

1. **What time did you actually get up?** Not the alarm. The moment your feet hit the floor.
2. **Did you get outdoor light within the hour? Yes or no.**
3. **How was the first hour, from one to five?** One is the morning from chapter one. Five is fine.

That third number is the one that matters, and it is worth explaining why it is a rating rather than a description. You are not trying to record how you slept, which you cannot judge. You are recording how the first hour felt, which you can, and which is the outcome this book is actually about.

What you deliberately leave alone

For seven days, do not change your bedtime. Go to bed when you are sleepy and not before.

This will feel wrong, particularly if you are tired. But an earlier bedtime imposed on an unmoved clock produces exactly what chapter three described: an hour of lying in the dark, which teaches your brain that bed is a place where you lie awake. The bedtime moves later in this method as a *consequence* of the clock moving, not as a cause of it.

Also leave the coffee, the alcohol, the temperature and the evening lighting exactly as they are. Those come in week two, and they come one at a time so that you can tell what did what.

What to expect, honestly

Days one to three are usually worse, not better. You are removing the weekend recovery sleep that has been partially masking your debt, and you have not yet moved anything. Expect the mornings to feel unchanged or slightly harder, and expect to be sleepy in the evening earlier than usual, which is the point.

By day five or six most people notice that falling asleep has become easier, before the mornings improve. That order is the correct one and it is a good sign: sleep pressure is arriving on schedule.

If your third-column ratings have not moved at all by day seven, that is information rather than failure, and chapter seventeen deals with it.

IF YOU CANNOT HOLD THE WEEKEND

Nearly everyone fails on the first Saturday. If you sleep in by more than an hour, do not restart the three weeks. Simply return to your fixed time the next day and continue, and note it in your log.

Chapter nine's finding applies here: the benefit is in avoiding chaos, not in achieving precision. One late Saturday is not chaos. Every Saturday is.

WEEK ONE, IN ONE PARAGRAPH

- Get up at the same time seven days a week, including the weekend.
- Get twenty minutes of outdoor light within an hour of getting up.
- Write one line each morning: rise time, light yes or no, first hour rated one to five.
- Change nothing else. Do not move your bedtime. Go to bed when sleepy.
- Expect the evenings to improve before the mornings do.

PART V · THE TWENTY-ONE DAYS

15

Week two: move the clock

Now you have something stable to push against. This week you push, fifteen minutes at a time, and you close the other end of the day.

Week one anchored you. If it worked, you are now getting up at a consistent hour, getting light shortly afterwards, and falling asleep somewhat more easily than you were. Nothing has moved yet. That was the point.

Week two does two things: it closes the evening end of the day, and it walks your rise time earlier if you need it to move.

First, decide whether you need to move at all

Look at your log and at the two numbers from chapter thirteen.

WHICH VERSION OF WEEK TWO IS YOURS

1. **If your workday and free-day wake times were within about an hour of each other**, your clock is not badly misaligned. Skip the shifting. Do the evening half of this chapter and go straight to week three. Your problem was regularity or the manner of waking, and week one has already addressed it.
2. **If the gap was more than an hour**, your body wants a later schedule than your life allows. This is the chapter that moves it.
3. **If the gap was more than three hours**, move at half the pace given below, expect this to take longer than three weeks, and re-read the warning at the end of chapter five.

Closing the evening

This half applies to everyone.

Chapter seven established what the evidence does and does not support here, and it is worth restating because it is unusual. Dimming your household lighting for the hours before bed **measurably moves your body clock**, by about an hour in the field study, in every participant tested. It does **not** improve the quality of that night's sleep.[89]

So you are not doing this to sleep better tonight. You are doing it because it is the second half of the same mechanism as your morning walk, and because it makes the shift possible.

THE EVENING, IN DESCENDING ORDER OF WHAT IT BUYS YOU

1. **Lamps instead of ceiling lights, for the last two to three hours.** This is the single change with a demonstrated effect on circadian timing, and it costs nothing.
2. **Warm bulbs rather than cool white ones** in the rooms you actually occupy in the evening. Homes lit with cool sources delivered roughly ninety per cent more biologically active light to their occupants.[88]
3. **Get out of bed to use a screen, or do not use one there.** The measured harm sits with in-bed use and with the interactive kind especially.[96]
4. **Do not buy blue-blocking glasses.** Chapter seven set out why.

Removing the one thing worth removing

Week two is also where alcohol comes out, and it comes out ahead of caffeine deliberately.

Chapter ten established that alcohol has the strongest evidence base of any lever in this book, that dream sleep is cut and delayed from as little as two standard drinks, and that the sedative effect people are actually seeking requires about five.[44] If you drink most evenings, this is the highest-value change available to you, and two weeks without it is the cheapest experiment you will ever run on yourself.

Caffeine waits until week three, not because it does not matter but because it is a smaller, better-tolerated adjustment and because changing one consumption variable at a time is the only way you will learn which one was yours.

Now the shift itself

If you decided above that you need to move, here is how.

WALKING YOUR RISE TIME EARLIER

1. **Move your alarm fifteen minutes earlier.** Not thirty. Not an hour.
2. **Hold that new time for three days.** All three, weekend included. The holding is not padding; it is what lets the clock catch up with the schedule.

3. **Get your morning light at the new time.** This is what makes the move stick. Without it you are simply setting an earlier alarm, which is the thing that was not working before you bought this book.
4. **Then move fifteen minutes again.** Two moves in week two is normal progress. Three is fast. Four is you rushing, and it will fail in week three.
5. **Let bedtime follow on its own.** Do not schedule it earlier. If the clock is moving, you will start feeling sleepy earlier without deciding to.

THE SIGN THAT IT IS WORKING

You will notice it in the evening before you notice it in the morning. Feeling genuinely sleepy thirty or forty minutes earlier than you used to, without having decided to, is the clock reporting that it has moved.

If your mornings improve but your evenings do not change at all, you have probably improved your regularity rather than shifted your phase. That is a real gain and it is a different one.

What can go wrong this week

You move and cannot fall asleep earlier. This is the commonest failure and it means you are moving faster than the clock is following. Stop advancing, hold where you are for four or five days, and only then resume. Nothing is lost.

You get the morning light on weekdays and not at weekends. This halves the intervention. The weekend mornings are, if anything, the more important ones, because they are where the drift happens.

You feel worse than in week one. Check whether you are actually holding each new time for three full days. Rushing produces exactly this.

WEEK TWO, IN ONE PARAGRAPH

- Decide whether you need to shift at all, using the gap between your workday and free-day wake times.
- Everyone: lamps instead of ceiling lights for the last two to three hours, and warm bulbs rather than cool ones.
- Everyone: take the alcohol out. It is the strongest single lever in the book.
- If shifting: fifteen minutes earlier, hold three days, morning light at the new time, then repeat.
- The evenings will tell you it is working before the mornings do.

PART V · THE TWENTY-ONE DAYS

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Week three: make it survive contact with your life

The third week is not about gaining more. It is about the difference between something that works for three weeks and something you still have in a year.

Most people who improve their sleep lose the improvement within two months. Not because the method stopped working, but because a holiday, an illness, a deadline or a child broke the pattern and nothing in the plan said what to do next.

Week three has three jobs: hold what you moved, add the remaining levers that apply to you specifically, and build the repair procedure you will need later.

Hold

Do not move your rise time again this week, even if the shifting was going well. The clock needs to settle at its new position, and the evidence for how long that takes is thin enough that a week of stability is a reasonable and conservative choice.

Keep the morning light. This is the part people quietly drop first, and it is the one doing the work.

Add the levers that are actually yours

Now, and only now, add whatever your chapter four diagnosis pointed at. One at a time, three or four days apart, so that you can attribute the result.

PICK FROM THESE ACCORDING TO YOUR DIAGNOSIS

1. **If fragmentation was your cause:** take the bedroom temperature down and the bedding up, since being too hot is clearly worse than being too cold.[102] A bath at 40 to 42.5 °C for ten minutes, one to two hours before bed, is the one thermal intervention with a meta-analysis behind it.[100]
2. **If you drink coffee after midday:** do the half-life arithmetic from chapter ten rather than adopting a cutoff hour, and shift your last cup earlier by two hours for the rest of the week.
3. **If your problem is a mind that will not stop:** five minutes writing tomorrow's list before you get into bed, specific rather than vague.[122] This is the best-evidenced technique in chapter eleven and it is still one unreplicated study, so treat it as worth trying rather than as certain.
4. **If you nap:** ten minutes, with an alarm, not thirty.[109]

Resist adding all four. If you improve after adding four things, you have learned nothing, and you will not know which one to defend when your life gets busy.

The weekend rule

This is the single most important paragraph in the chapter, because the weekend is where every schedule dies.

Chapter nine established the shape of the problem: the harm lies in irregularity rather than the benefit lying in precision.[106] So the

rule is not that you must rise at the same minute every day for the rest of your life. It is this.

> ONE HOUR
>
> On free days, allow yourself up to **one hour** later than your workday rise time. Not two, not three. Then get the light as usual.
>
> An hour of weekend drift is a rounding error. Three hours is a flight to another time zone and back, taken every week, which is exactly what made your Monday mornings feel the way they did.

If you are short of sleep and genuinely need to catch up, do it by going to bed earlier rather than by getting up later. That protects the anchor, and it is the one lever that does not cost you the shift you have just spent two weeks buying.

The repair procedure

Write this down somewhere you will find it in four months.

WHEN LIFE BREAKS THE PATTERN

1. **A bad night.** Do nothing. Get up at your normal time anyway. Do not nap long, do not go to bed early, do not sleep in the next morning. One bad night repairs itself if you leave the anchor alone.

2. **A bad week, from illness or a deadline.** Return to week one, not to week two. Fix the rise time, get the light, change nothing else for five days. You will usually be back within a week because your clock has not moved far.
3. **Travel across time zones.** On arrival, adopt the local rise time immediately and get outdoor light in the local morning. Do not chase your old schedule.
4. **A newborn, or anything else that makes a fixed rise time impossible.** Drop the shifting entirely and keep only the morning light whenever you are up. It is the one component that still works when nothing else is possible.
5. **A holiday where you deliberately let it all go.** Fine. Give yourself three days of week one when you come back.

What finished looks like

Not perfection, and not a fixed number on a tracker.

Look back at the third column of your log, the one to five ratings. Compare the last five days with the first five. That comparison is the outcome this book exists to change, and it is more informative than anything a device will tell you.

A realistic good result is a rise of one to two points, a workday and free-day wake time within about an hour of each other, and the first hour of the day being unremarkable rather than something to be survived. If your mornings have become uninteresting, the method has done its job.

WEEK THREE, IN ONE PARAGRAPH

- Stop moving. Hold the new rise time for the whole week and keep the morning light.
- Add one lever from your chapter four diagnosis, then another three or four days later. Not all of them.
- Cap free-day drift at one hour. If you need to catch up, do it at the bedtime end.
- Write down the repair procedure now, while it seems unnecessary.
- Judge the result by your own first-hour ratings, not by a device.

PART V · THE TWENTY-ONE DAYS

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When it does not work

Some of these have a fix. One of them means the answer was never in this book, and that is the possibility this chapter takes most seriously.

A book that only describes success is not being straight with you. Here are the five ways this method fails, in rough order of frequency, with what each one means.

"I still cannot fall asleep earlier"

Most likely cause: you moved faster than your clock.

A circadian clock walks. If you advanced thirty minutes every other day for two weeks, you asked it for three and a half hours, which is beyond what a realistic morning light exposure delivers.

The fix is counter-intuitive. Stop advancing, and go *back* fifteen minutes to a time you were sleeping well at. Hold it for a week. Then resume at half your previous pace. You will end up further ahead in six weeks than you would by pushing.

Second possibility: you are getting the mornings right and the evenings wrong, so you are pulling with one hand while pushing with the other. Check that the last two hours before bed are genuinely dim rather than nominally dim.

"It worked for two weeks and then stopped"

Most likely cause: the weekend.

This is the commonest relapse by a wide margin, and it is usually invisible to the person it is happening to, because a Saturday lie-in does not feel like an intervention. It is one. Two hours later on Saturday and Sunday reproduces the misalignment you spent a fortnight correcting, and you arrive at Monday having partially undone it.

Check your log rather than your memory. The rise times are written down precisely so that this question has an answer.

"My mornings improved but I am still tired all day"

Most likely cause: you are short of sleep, and this method does not manufacture hours.

Chapter one was explicit about this and it bears repeating here, because it is the failure people are least willing to consider about themselves. In a controlled experiment, people restricted to six hours for two weeks reached the impairment of two full nights without sleep, and reported feeling no sleepier than people restricted to four.[11]

If your first hour has improved but your afternoons have not, the timing was one of your problems and the quantity is another. Do the holiday test from chapter four again, honestly, and then add thirty minutes at the bedtime end rather than removing them from the morning.

"Nothing has changed at all"

If three weeks of consistent rise time and daily morning light produced no movement in your first-hour ratings whatsoever, that is genuinely informative, and it points away from this book rather than towards trying harder.

Go back to chapter four and work through the six causes again, this time assuming the answer is one of the two the method cannot

touch. Persistent unrefreshing sleep despite a regular schedule and adequate opportunity is a recognised clinical picture, and it is an accepted reason for a doctor to investigate.[49]

> GO AND SEE A DOCTOR IF ANY OF THESE APPLY
>
> You snore loudly, or someone has told you that you stop breathing, gasp or choke in your sleep. You wake with headaches or a sensation of suffocating. You fall asleep unintentionally during the day. You feel unrefreshed no matter what time you go to bed or how long you stay there. Your tiredness comes with persistent low mood or loss of interest. You act out dreams physically.
>
> And if you have fallen asleep at the wheel, or nearly, stop driving and get assessed before anything else.

"I keep waking at three in the morning"

This is a different complaint from the one this book addresses, and the method will not fix it directly.

Three broad possibilities are worth knowing. Alcohol is a common cause and chapter ten covers it. A too-warm bedroom is another, and chapter eight explains why heat does more damage than cold.[102] And early-morning waking with inability to return to sleep, occurring at least three nights a week for three months, is part of the definition of chronic insomnia, for which the recommended first-line treatment is cognitive behavioural therapy rather than anything in this book.[60]

A last word on what this book could and could not tell you

You have reached the end of a book that spent a great deal of its length qualifying its own claims. I want to close by explaining why, because it was not caution for its own sake.

Sleep is a field where the gap between what is popularly asserted and what has been shown is unusually wide, and where the assertions are unusually profitable. In writing this I found a famous screen study that its own authors declined to interpret as a blue-light finding, a bedroom temperature that everybody quotes and nobody has measured, a caffeine rule resting on twelve people, a mortality statistic reported at nearly twice its adjusted value, and a lamp, sold by the company publishing this book, that does not do the main thing lamps like it are sold on.

What survived all that is smaller than what most books promise, and it is real. Your clock runs slightly long and must be reset daily. Light is what resets it. Morning light pulls you earlier and evening light pushes you later, and the pivot sits at your own temperature low. Regularity matters more than duration. Two drinks is already a dose. And your own impression of how you slept is the least reliable instrument in the room, which is why the method asks you to write one line a day.

That is enough to change most people’s mornings. It is not enough to fix everyone’s, and the chapter you should re-read if it has not worked is the fourth one.

WHAT TO TAKE AWAY

- Cannot sleep earlier: you moved faster than the clock. Go back fifteen minutes, hold a week, resume at half speed.
- Worked then stopped: check your weekend rise times in the log rather than in your memory.
- Mornings better but days still hard: you are probably short of sleep, and no amount of timing substitutes for hours.
- Nothing changed at all: this points away from the method. Re-read chapter four and make an appointment.
- Waking at three: look at alcohol and room temperature first, and consider that this may be insomnia, which has its own recommended treatment.

APPENDIX

The twenty-one day log

Print these three pages, or copy the columns onto anything to hand. Thirty seconds each morning, and at the end you will know what actually happened rather than what you remember.

BEFORE YOU BEGIN

Fill these in once, on the day before you start. The gap between the first two is the size of your problem and the number the whole method works on.

My workday wake time

The time the alarm goes off now

My free-day wake time

Waking with no alarm, ignoring the first three days of a break

The gap between them

Under an hour: skip the shifting in week two

My rise time for week one

Your current workday time, not an earlier one

Where I will get my morning light

Twenty minutes outdoors within an hour of getting up

The cause I identified in chapter four

If it was five or six, see a doctor before starting

KEEP THESE WHERE YOU WILL SEE THEM

1. The rise time is fixed. Everything else is negotiable.
2. Light in the morning, dark in the evening, in that order of importance.
3. Move slowly, and hold. Fifteen minutes, then three days.
4. Measure, because your impression is unreliable.

One more thing to write down now, while it seems unnecessary. When something breaks the pattern later, a bad night needs nothing at all, a bad week needs a return to week one for five days, and a newborn needs you to drop everything except the morning light.

DAYS ONE TO ELEVEN

DAY	GOT UP AT	LIGHT?	FIRST HOUR	NOTE
WEEK ONE · ANCHOR AND MEASURE, CHANGE NOTHING ELSE				
1				
2				
3				
4				
5				
6				
7				
WEEK TWO · DIM THE EVENINGS, REMOVE THE ALCOHOL, THEN WALK THE TIME EARLIER				
8				
9				
10				
11				

DAYS TWELVE TO TWENTY-ONE

DAY	GOT UP AT	LIGHT?	FIRST HOUR	NOTE
12				
13				
14				
WEEK THREE · HOLD, ADD ONE LEVER, CAP THE WEEKEND AT ONE HOUR				
15				
16				
17				
18				
19				
20				
21				

AT THE END

Add up your first-hour ratings for days one to five, and for days seventeen to twenty-one. Those two numbers are your result. A rise of one to two points is a realistic good outcome, and it is worth more than anything a device will tell you, because it measures the thing this book set out to change.

If the two numbers are the same, that is not failure. It is information, and chapter seventeen tells you what to do with it.

APPARATUS

Sources

Every factual claim leads here. Every reference carries its level of evidence, so that you can weigh for yourself what you have just read.

How to read these references

Studies are not equal, and this book does not ask you to take them on trust. A **meta-analysis** pools and weights many separate studies, and is the strongest level of evidence. A **controlled trial** tests an intervention against a control group and can establish cause. An **experimental study** measures a phenomenon under controlled conditions, often in small numbers. An **observational study** records an association without being able to establish cause. A **review** synthesises existing knowledge without producing new data. A **consensus statement** comes from a health authority or learned society.

Where a reference rests on few participants, on a contested result, or on self-reported survey data, the text says so at the point where it uses it.

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