

Personal report for RNA-analysis of your chronotype

ID: XXXXXX



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Disclaimer: Intended use

The BodyClock RNA test is a test for determining the individual chronotype based on multiple hair follicles. The presentation of the test results is done through this report, which is sent to the customers by e-mail. By measuring the gene expression in the hair follicles, the individual timing of the melatonin onset can be determined. In addition to the visualization of the test results, customers also receive concrete recommendations with the goal of helping them improve their personal health and well-being through lifestyle-related interventions (e.g., adjusting the timing of daily activities).

The BodyClock RNA test is a lifestyle product and not a medical device. The BodyClock evaluation can support, but in no way replace professional medical advice, diagnosis and treatment by a licensed physician / medical practitioner or professional sleep counselor. The BodyClock test is not intended as a substitute for clients seeking emergency medical services, medical diagnosis, or consultation with a physician. BodyClock clearly and explicitly indicates to the customer that the test results of the RNA test and all other services of BodyClock are only non-medical services and that a physician / doctor should be consulted for medical issues.

1. How to read your personal report

Before we start with the results of the RNA analysis and our recommendations:

BodyClock does not only want to give you certainty about whether you are an early, late, or normal type and at what time you should best go to sleep, but we also want to help you understand your body better. That's why it's important that you take the time to read your personal report in its entirety.

Maybe you won't be able to implement all of our recommendations and tricks for supporting your body clock and improving your sleep at the same time. Don't worry, you don't have to implement everything at once. With this report, we help you prioritize and approach our recommendations step-by-step, so that you don't get overwhelmed. Make sure you do what feels comfortable and good for you.



Prioritization: Only a few changes can significantly improve your sleep and overall wellbeing.

1. Most importantly, you should follow our **sleeping** recommendation, followed by our recommendations for:
2. **Light**
3. **Eating**
4. **Exercising**



We have explained the influence of the individual areas on your sleep (bedtime, light time, eating time, exercise time) section by section independently of each other - based on scientific studies that you can access via the links in the **list of sources**. **This means that even if you can't adjust your bedtime and mealtime, but follow our recommendations for the light time, that alone can still have a positive impact on your sleep.**



If for some special reason you can't follow certain recommendations you wanted to implement, don't throw everything overboard: if you **go to bed** too late, make sure you **exercise** the next morning. If you **eat** too late in the evening, try to give your stomach at least 12 hours of rest before the next meal. If you can't exercise, try to get plenty of **daylight** in the morning and during the day.



On weekends, we want to relax and have fun. But if you go to bed much later than the time we recommend on Friday or Saturday, you may sleep poorly in the week and be tired and unconcentrated. **It will be much better for you, if you follow our recommendations on weekends (and on vacation) as well.**



As you go through our report, make a step-by-step plan for implementation and mark the different recommendations in the checklist in each section, for example, according to the following criteria:

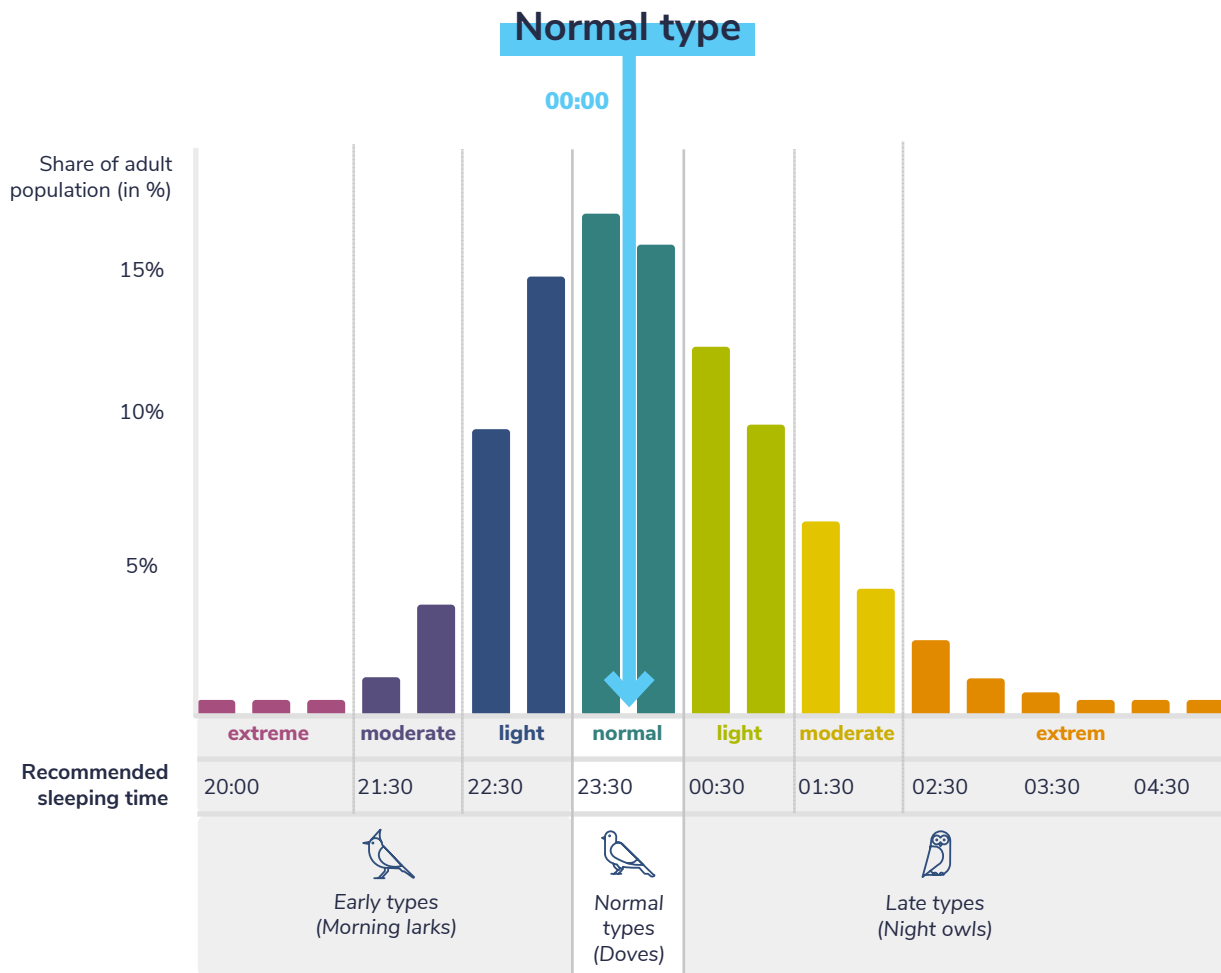
Checklist for prioritization:

- **Which routines do you want to adapt immediately**, which tricks can you incorporate into your routines straight away (e.g. cold showers in the morning, warm/hot showers in the evening): **mark these things green**
- **Which recommendations would you like to try in the medium term**, but are not sure if you will ever be able to incorporate them into your everyday life in the long term? **Mark these things yellow**
- **Which recommendations would you like to incorporate into your everyday life in the medium to long term**, but are currently unable to do so due to work or family reasons: **Mark these things blue**

You can use the checklist after 4, 8 and 12 weeks to check for yourself how well you were able to implement your own prioritization.

2. RNA-analysis of your **chronotype**

2.1 Your chronotype:



What does the recommended sleeping time at 00:00 o'clock mean?

The RNA-analysis of your sample has shown that your body begins to suddenly ramp up the production of the so-called sleep hormone melatonin at 21:30. In science, this timepoint is called the Dim Light Melatonin Onset (DLMO). After 2.5 hours (on average), the concentration of melatonin has reached a level so that your body switches to sleep mode and you become tired „naturally“. Therefore, your recommended time to start sleeping is at 00:00.



How do I compare to the general population?

About every third person is considered a normal chronotype, just like you. Approximately 30% of people have an earlier rhythm. And around 40% have a later body clock.

As a normal type, it is less likely that you will have to master special chronotypical challenges: Late chronotypes, for example, should not place important decisions that require morality or rationality in the morning. Early chronotypes, on the other hand, should avoid fighting their mental performance slump in the afternoon with coffee and sweets - especially if they have sleep problems. As a normal type, you are lucky that you are neither affected by one nor the other.

You can read all about the characteristics of early and late chronotypes in the [last chapter of this report](#).

Background

Why are there early, normal and late types in the first place?

Scientists argue that it is due to human evolution: For tens of thousands of years, it was advantageous for a group of people that someone was always awake at night. As a result, the group was better protected from dangerous animals or attacks of other tribes. Researchers have also observed this, for example, among the Hadza in Tanzania. This tribe of hunter-gatherers is one of the last people to live close to nature without electricity or modern tools. Over a time-period of 20 nights, all members of the tribe were asleep altogether just for 18 minutes a day.¹

The scientists argue that the natural selection has led to the fact that people have individually very different body clocks, which in extreme cases can differ by six, seven or even eight hours. Modern life, however, contrary to human evolution, dictates a rather uniform time: standard office hours are often from 9am to 6pm. This is despite the fact that working and living according to your individual body clock has an enormous influence on how efficient you are in your eight hours at work.

What is the body clock?

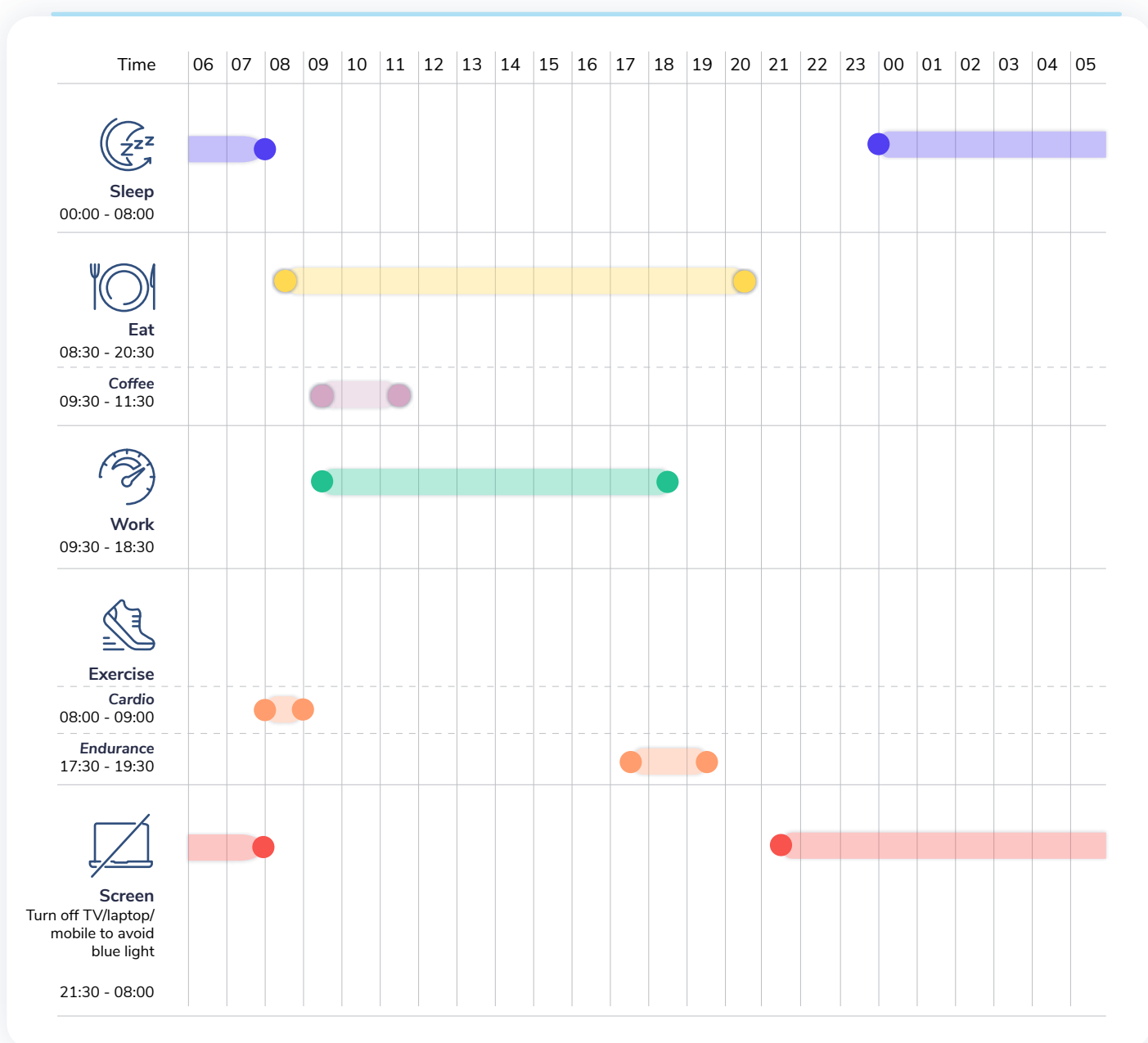
You may think that tiredness mostly has to do with external factors, such as daylight or how much you've moved in a day. This is not the case. Even people, who had spent several days in a bunker without access to daylight, followed an approximately 24-hour sleep rhythm. Most organisms, including plants and animals, have their own body clock. In humans and mammals, this clock is located in the brain, more precisely in the so-called ventral hypothalamus.

Our body clock indirectly influences the interplay of many hormones such as melatonin, cortisol, histamine, norepinephrine, serotonin, dopamine and acetylcholine. It also influences at what times we are mentally and physically capable and when our body switches to rest mode - completely independent of external influences. This internal, temporal rhythm of the body is also called the circadian system.

3. Your optimal daily schedule

The optimal daily schedule shown below is based on your individual Dim-Light-Melatonin Onset (DLMO), the time when melatonin increases in your body. This does not only tell you when you should go to sleep, but also when different hormones are released throughout the day and when important body functions (e.g. metabolism) take place or rest.

We assume an average sleep duration of 8 hours. However, it may be possible that you sleep shorter or longer for genetic reasons. In this case, you should still adhere to the recommended meal and coffee times below, but change the remaining times according to your sleep duration.



4. Explanation of your optimal daily schedule

4.1 Sleep



* We assume an average sleep duration of 8 hours. However, this can vary from individual to individual. A healthy sleep duration is between 7 and 9 hours. You can find out your individual sleep duration if you start sleeping at the recommended time over several days and wake up naturally, without an alarm clock - for example, on vacation.



Your optimal time to sleep: 00:00 to 08:00 o'clock

00:00 is a good time for you to start sleeping. At this time, the concentration of the sleep hormone melatonin is high enough in your body to switch to rest mode, regenerate during the sleep and build up new strength for the next day.

Tip: If possible, try to avoid naps and/or **coffee** altogether. If you get tired in the afternoon, **exercise** or expose yourself to **light**, e.g. by taking a walk outside or using a daylight lamp. But: Avoid pushing yourself too hard, otherwise you will get more tired very quickly.

Background

The release of the sleep hormone melatonin is one of the most important tools of the body clock to support your day-night rhythm. Melatonin lowers the body temperature, makes you sleepy and boosts the immune system. The temporal rhythm with which your pineal gland produces melatonin is primarily genetically determined, dependent on sunlight and overall very stable.

What happens if you fight your tiredness with light or physical activity in the evening?

If you're not too late, you won't completely skip the melatonin cycle and still fall asleep well. However, the signals of your body clock might wake you up earlier in the morning than you desire. This is because your body clock sends these signals in a relatively stable rhythm - regardless of whether you go to bed later than usual on an evening.

Basically, you should take the signals of your body clock seriously and go to sleep when you are tired. If you continuously act against your body clock and build up sleep deprivation, you put yourself at high risk for numerous chronic diseases (e.g. chronic sleep disorders, cardiovascular diseases, depression).²

Why you should also keep the optimal sleeping time at the weekend?

A regular sleep-wake rhythm is the most important factor to live in sync with your body clock. If you always go to sleep and get up at the same time, you have a good chance of increasing the strength of your body clock.

Why you should avoid naps or limit them to a maximum of 10 minutes?

There are two different systems in our body that make us tired. On the one hand, there is the circadian system, which, among other things, stimulates the production of the sleep hormone melatonin after darkness. On the other hand, there is the so-called homeostatic factor, the sleep pressure: the longer we are awake, the greater the so-called sleep pressure becomes. Sleep pressure increases evenly throughout the day and decreases again almost as evenly during sleep, but at a faster rate. A nap of 30 minutes or longer reduces sleep pressure significantly and makes it more difficult for you to fall asleep in the evening.

At the same time, several studies have shown that a nap of 20, 30 minutes or longer had no more positive impact on performance than a 10-minute nap (power nap). On the contrary, those who nap longer at lunchtime are less likely to perform well for at least 30 minutes afterwards. According to scientists, this could be due to the fact that these people have entered the deep sleep phase, which tends to result in sleep inertia after waking up.^{3 4} However, the nap should not be much shorter than 10 minutes, because a nap of 30-90 seconds had no positive influence on the performance at all.⁵

You can find more tips and tricks for sleeping in chapter 5 [tips and tricks for your sleep](#). If you would like to get additional help for your sleep problems, you are welcome to use a personal coaching session with our experienced sleep consultants. You can book these sessions on our [website](#).



Checklist: Sleep

	After	4 weeks	8 weeks	12 weeks
	Date	_____	_____	_____
I stuck to my optimal time to sleep. (+/- 30 minutes).		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I also followed the recommended time to sleep on weekends and on vacation.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I avoided naps or limited them to 10 minutes.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4.2 Eat & Drink

4.2.1 Eat



Our
recommendation



Your optimal time to eat: 08:30 to 20:30 o'clock

If you went to bed at our recommended time and did not set an alarm clock, try to eat between 08:30 and 09:30 and do not postpone your first meal.

You should eat as much as possible at the beginning of the day. A carbohydrate-rich breakfast is ideal to start the day with sufficient energy. In the evening, try to eat as small a portion as possible, preferably high in protein and low in carbohydrates.

If you also want to lose weight: 08:30 to 18:30 o'clock

With the so-called intermittent fasting (time-restricted eating), you try to limit your food intake to 10 hours or less. In a particularly impressive study, chronobiologist Satchin Panda asked ten overweight people to restrict their time to eat from 14 hours to a 10 hours in a time-window ideal for their chronotype. During those 10 hours, they were allowed to continue eating whatever they wanted, whenever they wanted - including all sorts of snacks and drinks. All participants lost weight. They also reported feeling fitter during the day and sleeping better.⁶ Many other studies have confirmed the benefits of intermittent fasting for one's health and quality of life.

Background

Why you should eat as early as possible and rich in the morning?

Your body can produce insulin best in the morning. Insulin stimulates the processing and absorption of (blood) sugar. This means your body can more easily convert food into energy and does not store it as fat. Carbohydrate-rich foods are therefore best eaten as early as possible. At the same time, an early breakfast is also a sign to our body that the day is „getting started“.⁷

Why not eat late and only eat small portions in the evening?

The last meal should be consumed at least 3.5 hours before bedtime. Digestion generates heat. However, in order to enter sleep mode, the body must cool down. Also, the body starts producing melatonin at least 2.5 hours before the optimal time to sleep. In turn, a higher concentration of melatonin prevents the production of insulin, so that blood sugar is difficult to be broken down and is much more likely to be converted into fat.⁸

Why give up carbohydrates in the evening and rather eat protein-rich food?

In contrast to the morning, the body releases significantly less insulin in the evening. The digestion is therefore supported rather with a protein-rich and low-carbohydrate meal. Eggs, beans, legumes, meat, etc. are therefore ideal foods. For older people, the high-protein diet in the evening has an additional advantage - it supports the synthesis of muscle proteins and thus counteracts the natural muscle breakdown at an old age.

4.2.2 Coffee



Your optimal time for drinking coffee

Avoid caffeinated coffee as much as possible. If you can't resist, make sure to drink it between 09:30 and 11:30.

Background

Caffeinated coffee can still have a significant negative impact on your sleep even if it is only drunk in the morning. This is because the body takes a very long time to break down caffeine. Even those, who drank coffee at 7:00am in a study, still had almost 18% of the caffeine left in their blood at 11:00pm when they went to bed.⁹ A study has shown that people need 5-6 hours to break down 50% of the caffeine. People with sleep problems, therefore, should not drink caffeinated coffee at all, if possible, but revitalize their body and mind in other ways: for example, through daylight or exercise.

If you can't do without caffeinated coffee at all, try to limit your coffee drinking to after breakfast or when you go to work. Alternatively, you can of course switch to decaffeinated coffee, which you can drink at any time. Make sure not to drink coffee before breakfast or lunch, as it may reduce your appetite or hunger.^{10 11}

4.2.3 Alcohol



Your optimal time to drink alcohol (if applicable)

Alcohol impairs sleep and is also harmful to your health. If you can't completely do without it, drink it earlier rather than later, for example before dinner. This way, your body can break down the alcohol before you fall asleep. Exactly how long this takes depends on factors such as age, gender and weight. [Here>>](#) you can calculate when you should stop drinking alcohol at the latest. For example: for a 50-year-old man with an average body weight of 80kg and a height of 1.80m, the so-called metabolization of the alcohol in a beer (12oz) takes about 2 hours.

Background

Some people drink an alcoholic beverage just before they go to bed to help them fall asleep. In fact, alcohol can promote falling asleep. However, this effect can wear off after just a few days due to „habituation.¹² In the second half of the night, you will then have to adjust to a disturbed, shorter and lighter sleep.¹³ The reasons why alcohol consumption „interrupts“ the second half of the sleep have not yet been conclusively clarified scientifically. Chronobiologist Satchin Panda writes that the body „dries out“ by burning the alcohol.¹⁴ In addition, studies have shown that alcohol increases the risk of developing nocturnal breathing disorders (sleep apnea, dangerous snoring).



Checklist: Eat & Drink

	After	4 weeks	8 weeks	12 weeks
Date	_____	_____	_____	_____
I mostly stuck to my optimal time to eat (+/- 30 minutes).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I ate more in the morning than in the evening.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
For breakfast: rich in carbohydrates und plenty	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
In the evening: Proteins instead of carbohydrates (e.g. eggs, legumes, meat)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coffee: I gave up caffeinated coffee or only drank one cup in the morning.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Number of days with coffee in the afternoon/evening: _____	Number of days with coffee in the afternoon/evening: _____	Number of days with coffee in the afternoon/evening: _____	
Alcohol: I abstained from alcohol or stopped drinking alcohol early enough	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Number of days with many or too late drinks: _____	Number of days with many or too late drinks: _____	Number of days with many or too late drinks: _____	

4.3 Work



* Assumption: 8 hours working time + 1 hour break



Your optimal time to work: 09:30 to 18:30 o'clock

If you suffer from sleep inertia in the morning, for example because you don't sleep enough or you have to work earlier than we recommend, then use this time to complete simple, organizational and/or standardized tasks. Also, work on important decisions that challenge your morals or rationality in the later hours.

Background

How can normal types better organize their work according to the time of day?

The chronotype does not only affect mental or physical abilities. Researchers have also found that moral, ethical and rational behavior is associated with how „awake“ someone is.¹⁵ However, studies have usually only distinguished between late and early types. You should therefore observe yourself closely as a normal type: If you mentally go through the following experiments, you might find yourself in one of the two groups, and then you can organize your work accordingly:

Researchers had early and late types play a dice game and found that late types cheated significantly more in the morning than in the evening. For early types, it was the other way around.^{16 17} Studies have also shown that late types act more rationally in the afternoon. This means, for example, that they are more likely to accept an unfair offer in the afternoon than to come up empty-handed.

Even in studies of mental performance, researchers have usually distinguished only between early and late types: For example, they tested the attention and mental performance of early and late types 1.5 hours after waking up and 10.5 hours after waking up. Especially on particularly difficult tasks, the results of the late types were better in the second half of the day.^{18 19 20 21 22} Normal types should not underestimate, however, that most people have another performance peak in the (early) afternoon. For example, hand-eye coordination is particularly high at this time. You should definitely take this into account when planning your work, and then rather solve difficult tasks instead of doing meetings or phone calls.

Important: Even normal types, like you, can suffer from sleep inertia²³ in the morning after getting up, especially if you have been living against your own body clock. If you adjust your sleep times to our recommendations, your sleep inertia should be reduced.



Checklist: Work

	After	4 weeks	8 weeks	12 weeks
Date	_____	_____	_____	_____
I mostly stuck to my optimal time to work (+/- 30 minutes).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If there is more of a tendency to be an early type: I usually put difficult tasks and decisions in the first half of the day and easy, bureaucratic ones in the afternoon.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4.4 Light



Your optimal screen-free time: 21:30 to 08:00 o'clock

Prevent exposure to bright light after 21:30 o'clock. Avoid using your cell phone, computer and TV and turn on the devices' night mode. Instead, try to get as much daylight as possible in the morning or immediately after getting up. Use light whenever you get tired during the day or in the afternoon (e.g. with a daylight lamp).

You have to get up much earlier in the morning than we recommend?

With light, you can try to signal your body that the day begins and ends earlier than it actually does. Theoretically, your sleeping hours will shift and you can get up and go to bed earlier. Because: Your chronotype is always relative to the sun or daylight. If you travel to another time zone, your body will have adapted after two weeks at the latest. You will still be a normal type, but your sleeping times will have adapted to the local light conditions.

In practice, however, this approach is very difficult to implement: In reality, there is often a lack of discipline to perform light irradiation every day and the light intensity is often insufficient. This can further damage the body clock in unfavorable cases and exacerbate sleep problems.

To „trick“ your chronotype, you would have to implement the following tips with particular discipline:

- **In the morning:** Try to get at least 30 minutes of daylight after getting up. If it is still dark in the morning in winter, you can use a daylight lamp during breakfast. Make sure that the lamp is a certified medical product. Early morning **exercise** also signals your body clock that the day is about to start.
- **In the evening:** Avoid all display devices 2.5 hours before you go to sleep. Also the night mode on smartphones and tablets can keep you awake. Make sure to turn down the lights in your home. Tip: Many LED lamps today are dimmable. Alternatively, purchase special night or sleep lights. Blue light-filtering glasses can be helpful if there is no other way to escape the light in the evening and at night - especially in summer, when evenings are particularly bright for a long time.
- **Weekends:** A regular sleep-wake rhythm is the most important factor to live in sync with your body clock. However, if you have to interrupt your sleep with an alarm clock on work days due to early working hours, it is immensely important that you sleep in on the weekend without an alarm clock and reduce the accumulated lack of sleep from the week as much as possible. Otherwise, you increase the risk for chronic sleep disorders, cardiovascular diseases, metabolic diseases or depression and reduce your life expectancy.

Background

We have known since the 1980s that bright light in the evening and night hours is unhealthy. A Czech researcher was able to show that bright light between midnight and 2:00am completely upsets the natural course of body temperature.²⁴ Since then, numerous studies of shift workers have been able to show that nocturnal light exposure can be associated with heart disease, metabolic diseases such as diabetes, gastrointestinal disorders, immunological disorders, cancer, and a number of psychiatric problems.²⁵ Nevertheless, the cell phone and computer age has made shift workers out of all of us: Hardly a day goes by when we don't look at a glaring display before going to bed.

Why you should avoid blue and bright light in the evening and maximize it in the morning?

Researchers only discovered how the sun regulates the day-night rhythm in humans in the 1990s. On the retina of the eye, there are not only cells responsible for vision (rods and cones), but also those that respond to brightness alone (ipRGCs or photosensitive ganglion cells). They have nothing to do with imaging, but send activating signals to our body clock in the morning when light enters. That's why it's especially important that you get as much daylight as possible in the morning after getting up.

These cells are particularly sensitive to blue light of a certain wavelength. Most smartphone, computer and TV manufacturers have already reacted to this and offer a night mode that filters blue light. However, recent studies have shown that not blue light alone, but also very intense „yellow“ light can suppress the sleep hormone melatonin.²⁶ Therefore, using an iPad in night mode can still reduce the melatonin production. Hence, it is important that the night mode in your device does not only filter blue light, but also turns down the overall brightness.

Tip for night mode: Most phones and tablets have a manual timer function for this or can automatically switch on the night light function at sunset. For older Android devices, there are also numerous free apps for this. Apple devices have the „Night Shift“ function pre-installed from the iPhone 5s or iOS 9.3 onwards.



Checklist: Light

	After	4 weeks	8 weeks	12 weeks
Date	_____	_____	_____	_____
I usually stopped using the cell phone/TV/laptop 2.5 hours before bed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
In the morning, I almost always exposed myself to daylight.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I used light when I was tired during the day.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I used the night mode on cell phone/TV/laptop.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I gave up very bright light especially from LED lamps in my home 2.5 hours before bedtime.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



4.5 Exercise



Your optimal times to exercise

When you should exercise depends on the goal you are pursuing:

For the improvement of your sleep: 08:00 to 09:00 o'clock

To improve the quality of your sleep and best support your circadian day-night rhythm, you should do at least 20 minutes of cardio exercise in the morning after getting up. Cardio or „aerobic“ exercise means moving large muscle groups over a long period of time, such as swimming or jogging.

i Tip: If you exercise in the morning or directly after getting up, your body is still relatively cold. This increases the risk of an injury, e.g. if you twist your ankle while jogging. So warm up well before you start exercising.

For optimizing your physical performance: 17:30 to 19:30 o'clock

At this time you will have the highest performance level. This is the ideal time for increasing your muscle strength or strengthening your endurance.

Further time recommendation

There is evidence that motor skills, such as hand-eye coordination, which is important in ball and team sports or yoga, reach their peak after noon.²⁷

Tip: Sport also functions as an instant activator on our body clock. Whenever you are tired but don't want to be, give up coffee and sweets and exercise instead and fill up on light. This way, you can immediately increase your blood pressure, heart rate and the level of the stress hormone cortisol. But: avoid pushing yourself too hard, or you'll quickly feel even more tired.

Background

In general, exercise improves your sleep²⁸, learning and memory skills²⁹, and it acts as a natural antidepressant.

Why to do cardio exercise in the morning for a better sleep?

Researchers had subjects jog on a treadmill for half an hour in the morning, at noon, or in the evening, and monitored their blood pressure and sleep. The morning subjects reported significantly better results than the other subjects: They fell asleep faster, had fewer midnight awakenings, and prolonged deep sleep.³⁰ In the next chapter (tips and tricks), you can find out more why you should do cardio exercise before breakfast.

Why exercise in the second half of the day to optimize your performance?

A study of professional athletes has shown that their performance can vary by up to 26% depending on the time of day.³¹ Blood flow, blood pressure and especially body temperature increase continuously from morning to evening, which improves the oxygen supply and thus the performance of the muscles.³²

Why not work out after dinner?

It is recommended to do high-intensity strength or team sports before dinner. High-intensity sports are hard to do right after dinner. If you push exercise even further into the evening or night, exercise can increase cortisol levels to morning levels and delay the nighttime melatonin surge. It also increases body temperature and heart rate. All of these factors make it more difficult to fall asleep. Exercising before dinner has another advantage: it reduces, at least for a short time, hunger.³³



Checklist: Exercise

	After	4 weeks	8 weeks	12 weeks
	Date	_____	_____	_____
I did cardio exercise after I got up.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I did exercise in the second half of the day to optimize my performance.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
When tired during the day, I exercised without pushing myself too hard.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



5. More tips and tricks for a better sleep

You can support the activating and calming functions of your circadian system through various tricks. On the one hand, you will be more awake during the day and more tired in the evening. On the other hand, our researchers found out that the circadian system can be trained similarly to a muscle by...:

- ...following the time recommendations regularly, sleeping and eating at the same time as far as possible, even at weekends and on vacation.
- ...trying to follow some of the simple tricks hereafter and incorporating them into your daily routine.



Waking up and getting up

Immediately after getting up, your blood pressure, body temperature and cortisol levels are low.

Stimulate these pulse generators of your circadian system through:

Cold shower: As cool as you can stand. Your body will pump blood to vital organs and increase the core temperature. This triggers „waking“ signals.

Light: After the cold shower, exposure yourself to daylight. Combine the light shower with **exercise:** go for a walk around the house or, even better, do 20-30 minutes of cardio exercise outside.

Note: Drink enough water before running, as your body dehydrates overnight. Exercising before breakfast will cause your body to convert free fatty acids to energy instead of blood sugar. That means running before breakfast is more likely to cause you to lose weight than running after breakfast.



Bedroom

The bedroom should be cool, dark, and noiseless. Choose the coolest room in the home as the bedroom and, if possible, cool the room by opening the window. The body needs to cool down to get into rest mode. In a cool room, blood flows to your skin to keep it warm. As the blood flows away from the core of the body, the body temperature drops and you will fall asleep more easily.³⁴



Directly before bedtime

Take a shower or warm bath just before bed. Similar to a cold room, warm water stimulates blood flow toward the skin and away from the core of the body.³⁵

Read a book: Reading can help you switch off. Non-fiction books establish a stronger connection between your person and reality. However, you want to „say goodbye“ to reality at this moment. Novels are therefore more suitable. Avoid tablets, if possible. Even with lower light levels, they can still have a negative effect on your sleep.³²



In the night

Thirst and toilet

If you wake up in the middle of the night to drink a glass of water or go to the bathroom, turning on the lights will make it much harder to get back to sleep. Keep a glass of water next to your bed, which will save you the walk. Or, if you have to go to the bathroom, use your phone's flashlight function to illuminate the floor.³⁶

Some people want to avoid taking a drink at night to avoid having to go to the bathroom. However, you don't drink more than a few sips when you wake up. It is much worse to ignore your thirst: a dry throat is often the reason you wake up in the first place.

Sudden heat

Some people suddenly wake up at night because they feel too hot. This could be due to the mattress. For example, foam mattresses are known to absorb heat. In the first few hours, this helps you to cool down. But after a few hours, foam mattresses can start reflecting heat back to your body. Waterproof pads, which are supposed to protect the mattress from dirt, also often have this heat-reflecting effect.

Try to keep the temperature in the room stable, for example, by leaving the window only slightly open or closing it again after airing (to cool down the room) before going to bed.

Loud noise

You live on a busy street or you can hear loud noises, like sirens and cars, at night or in the morning? Try turning on a fan that „muffles“ all other sounds. Or download an app that creates a white background noise.

Earplugs: Many people find earplugs distracting and therefore don't give them a chance. Try different ones: hard, soft, silicone or foam. Give them a chance for two to three nights. You usually get used to them quickly.

6. What distinguishes early from late chronotypes

As a normal type, it is less likely that you will have to master special chronotypical challenges: Nevertheless, it may be exciting for you to get to know the differences. Maybe you feel that you belong to one or the other type and can draw the appropriate conclusions for your daily program.

Late chronotypes sleep shorter and worse, and have a harder time becoming successful professionally. Numerous studies point to this. And this is not because they are lazier or less intelligent, not because they have a biological disadvantage, but because the standardized time model of our modern life tends to disadvantage the late type: People tend to work more in the first half of the day, when late types are sometimes still sleepy. When they reach their peak performance in the early evening, it's time for social activities.

The disadvantage of the late chronotypes already starts in elementary school, as researchers at the University of Heidelberg found out in a study with elementary school students.³⁷ Late types received lower scores on average, although they scored slightly better on the intelligence test than early types.

In secondary school (ages 10-17), late types dropped off even further, as the same researchers found.³⁸ A Dutch study³⁹ found that the poorer grades of late types are mainly due to early exam times - when late types are still „mentally“ asleep but early types have their first performance peak. Because exams still mostly take place in the morning at university, late types keep having this disadvantage even after school.^{40 41 42}

The extent to which this disadvantage continues later in terms of professional success and salary has not been conclusively proven scientifically. There are only a few studies on income that have differentiated between early and late types:

A Danish study concluded that late types earn 4-5% less than early types.⁴³ Various American surveys⁴⁴, however, have found even much greater pay disadvantages. Entire books have also been written about what successful people do before breakfast. In: „What the Most Successful People Do Before Breakfast“ there is also a list of successful business leaders who get up before 6am: From Apple's Tim Cook, who writes his first emails at 04:45am to the editor-in-chief of the American edition of Vogue fashion magazine, who plays her first round of tennis before 6am.⁴⁵ In this popular science literature, the impression is often created that not performing in the morning only has to do with a lack of discipline. And not with the fact that late types simply have their performance optimum at a different time.

Health

Numerous studies have also shown that late types tend to have a higher risk of developing diabetes or cardiovascular or neurotic and psychological disorders. The reasons for this may be due to a lack of sleep (from getting up too early) and the resulting poorer sense of well-being, on the one hand, and social factors,

on the other: People tend to drink more alcohol, smoke more cigarettes and eat more unhealthy fast food in the evening. Early birds often bypass these times.

But studies have also identified biological causes: The structure of the brain differs. Late types have more gray brain matter on average in some brain regions.⁴⁶ For example, in those regions that are responsible for risk-taking. This means late types tend more towards risky decisions and behaviors.⁴⁷ On the other hand, late types generally have less white brain matter.⁴⁸ This white brain matter is likely to play a much greater role in determining mental performance and learning success than previously thought. The different structure of the brain between early and late types could also be due to the fact that late types get less sleep and are thus more likely to suffer from social jetlag.⁴⁹



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