

# Strategies for Improving Sleep

## Why is Sleep Important?

Sleep is a time when our bodies and minds get to rest and focus on tasks that they don't have much time for during the day, such as healing, fine-tuning bodily functions, forming long-term memories, and forgetting information we don't need to memorize. Sleeping also helps us re-energize, and repair the wear & tear that happens to our bodies during the day.

When people don't get good sleep, it can impact their health in many ways:

- Healing processes can happen more slowly
- Depression and anxiety can increase
- Memory, concentration and decision making can be impaired
- Work performance and relationships can suffer
- Risk of developing heart disease, high blood pressure, obesity, infections, and digestive issues can increase



## The Basics of Sleep

Sleep is divided into two states: NREM (**N**on-**R**apid **E**ye **M**ovement) and REM (**R**apid **E**ye **M**ovement) sleep. We alternate between these two types of sleep throughout the night. Here are a few other helpful terms:

- A **sleep episode** is the amount of time that passes from when a person turns the lights out to go to sleep to when they get up in the morning to start their day.
- A **sleep cycle** is a shorter period of time - about 90 minutes. People experience ~5 sleep cycles/night.
  - Each sleep cycle begins in NREM and progresses through deeper NREM stages to REM sleep. A picture of typical sleep cycles can be found on the next page.

### NREM Sleep (Stages 1, 2, and 3 of Sleep):

NREM sleep is divided into light sleep (stages 1 and 2), and deep sleep (stage 3).

#### Stage 1 Sleep (Light Sleep; S1 in the diagram below)

- Breathing becomes more regular and heart rate slows down
- It is very easy to wake up a person in stage 1 sleep because the person is aware of sounds in their immediate environment even though they are technically asleep
- About 5% of the night is spent in stage 1 sleep. Many people think they are awake when they are in stage 1 sleep, and this makes sense, since when a person is aware of the noises around them and can consciously control their thoughts, it seems like they are awake.

#### Stage 2 Sleep (Light Sleep; S2 in the diagram below)

- Muscle tension decreases

- Body temperature drops
- Reduced awareness of what's happening in surrounding area. Can be woken up by noises, but they need to be loud or personally relevant (e.g. a mother hears her baby crying)
- Adults spend about half the night in stage 2 sleep.

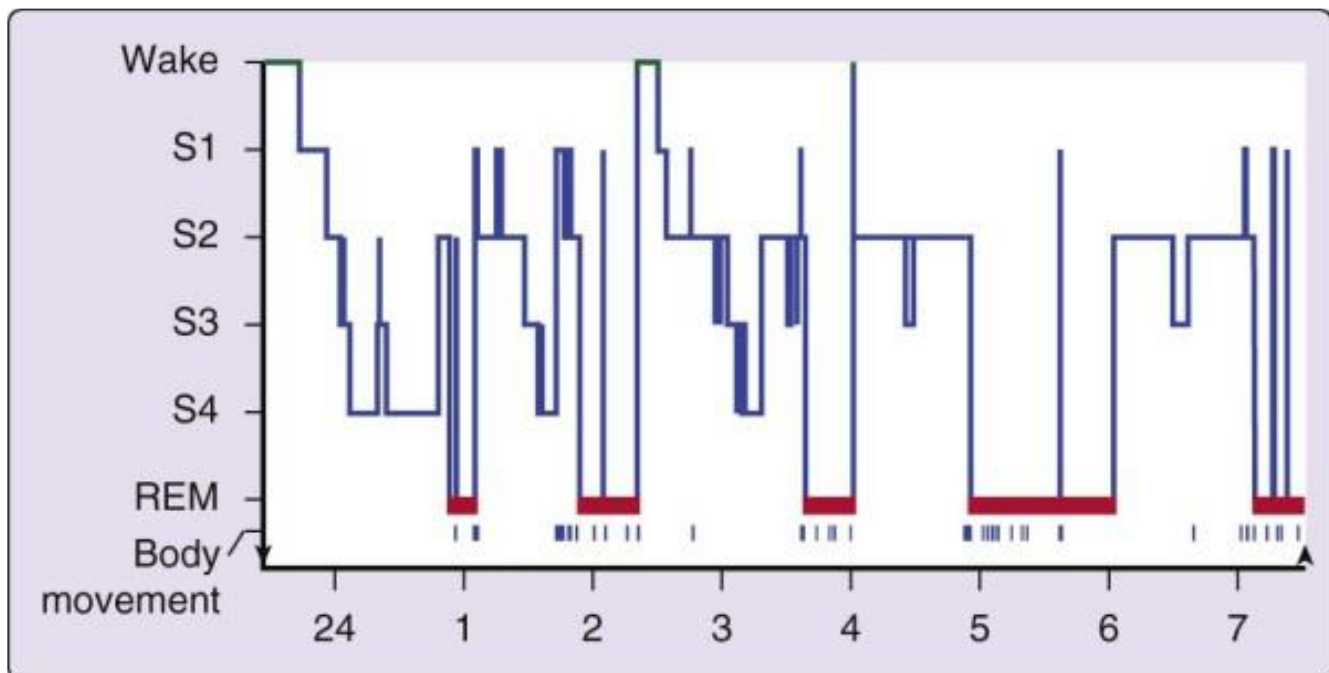
### **Stage 3 Sleep (Deep Sleep; S3 in the diagram below)**

- A person in this stage of sleep is difficult to wake
- People dream in this stage, but the dreams are less vivid than in REM sleep
- This type of sleep is needed for good physical health, tissue repair, immune system function, and secretion of human growth hormone
- About 25% of the night is spent in Stage 3 sleep.

### **REM Sleep:**

#### **During REM sleep:**

- Heart rate increases
- The brain is quite active, and vivid dreams are common
- REM sleep is important for emotional well-being and mood regulation
- About 20% of the night is spent in REM sleep. People get most of their REM sleep during the second half of the night.



### **Progression of sleep stages during a single night in a normal young adult**

Source: Carskadon and Dement (2011)

The diagram above shows how a person progresses through sleep cycles during the night (in this image, an 8-hour chunk of time).

As you can see, we get most of our deep sleep (S3 and S4) in the first half of the night, and most of our REM sleep during the second half of the night. We also get more light sleep (S1 and S2) during the second half of the night. *(In case you are wondering, the S3 and S4 stages mentioned in the diagram have been combined into one sleep stage [S3] since this diagram was produced).*

At the end of each sleep cycle, a person experiences a brief awakening (“Wake”, in the diagram above). This means that people actually wake up, or nearly wake up, several times per night. Most people who have a good night’s sleep claim that they sleep through the night without waking up, but in reality, they don’t. For most sleepers, these awakenings are so brief that they don’t remember them the next morning. When people have sleep problems however, it is common for them to get frustrated with these awakenings and feel that they are not sleeping well. Unfortunately, this frustration can lead to longer awakenings, since feelings of stress, worry & frustration make the mind & body more alert and make it difficult to go back to sleep.

It can be helpful to know that **it is normal to wake up several times per night, and this is not a sign that a person is sleeping poorly.** When people have difficulty getting back to sleep, they often find it helpful to use deep breathing, imagery, or other relaxation strategies to help them fall back asleep. Some people also find it helpful to write down things that are bothering or frustrating them in a journal they keep by their bed.

When a person cannot get back to sleep after 20 minutes, it is best for them to get out of bed and go to another room to do something relaxing and pleasant until they feel sleepy and ready to go back to bed.

## Forces that Govern Sleep

There are two major forces that regulate people's sleep cycles: circadian rhythm and sleep pressure.

### Circadian Rhythm:

Humans have a circadian rhythm, which means that our bodies have functions that are meant to happen at certain times of day. For example, we have the easiest time sleeping when it is dark out, and the easiest time waking up when it becomes light in the morning. Our circadian rhythm is like an internal clock: it sends signals to the body telling it when to get sleepy and when to feel awake.

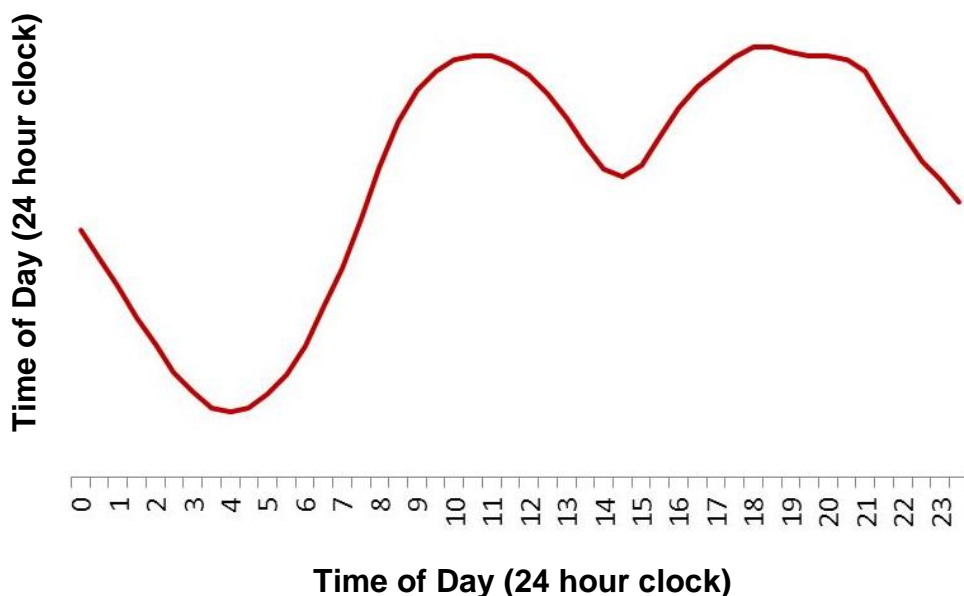
Our brains use the amount of light around us to program our circadian rhythms. Because of this, many people find it helpful to use blackout curtains and dim lights at night, and to use bright lights in the mornings, to help signal the body when it is time to get sleepy and when it is time to wake up.

People can have different circadian rhythms, and a person's rhythm can change as they age. This is why many older people find that they don't need to sleep as long, and begin waking up earlier in the morning.

The optimal time to go to sleep differs from person to person. Many people who have difficulty falling asleep find it helpful to notice when during the evening they feel most sleepy, and to go to bed at that time (every night) rather than going to bed at a time when they feel more awake.

Since our bodies create circadian rhythms that stay the same from one day to the next, people tend to have better sleep when they have a consistent sleep-wake schedule. This means going to bed and getting out of bed at the same time every day – including weekends.

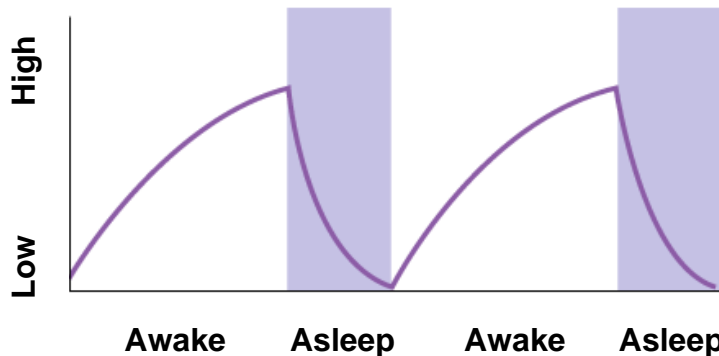
### A Typical Circadian Rhythm



## Sleep Pressure:

The body's natural desire to sleep after being awake for a long time is called sleep pressure. Sleep pressure increases steadily throughout the day (while we are awake), and by 10:00pm or so, it is quite high. Sleep pressure is associated with the amount of adenosine in a person's body. This chemical builds up in the brain over the course of the day, and the greater the build-up, the sleepier a person becomes.

### Sleep Pressure Over A Typical 24 Hour Period



## Activities that Interfere with Circadian Rhythm & Sleep Pressure:

There are things people can do in their everyday lives that can weaken circadian rhythm and/or sleep pressure, and interfere with a person's feeling of nighttime sleepiness and daytime wakefulness. For example:

- Naps can reduce sleep pressure because they can trick the body into thinking that it has already finished one of its nighttime sleep cycles. This increases the chance that a person will feel alert and awake at night, and have trouble falling asleep.
- Caffeine interferes with the build-up of adenosine in the brain, which is why coffee and tea make people feel alert and prevent sleepiness. Because of this, consuming caffeine too late in the day can decrease sleep pressure and a therefore decrease sleepiness at night.
- Using bright lights at night can trick people's circadian rhythms into thinking that it's not time to get sleepy. Similarly, keeping the lights dim in the morning, or staying inside all day, can trick the body into thinking it should feel tired rather than alert.
- Going to bed and waking up at different times every day can interfere with circadian rhythm, confusing the brain so it's not sure when to make a person sleepy and when to wake them up.

## How to Improve Sleep

Sleep is quite complex, and there are lots of different things that can interfere with a person's sleep. Some examples include light level, bedtime and wake time, noises, pets, hormones, medications, worries, family members, body temperature, etc., and the list goes on. When a person has difficulty sleeping, it's important to

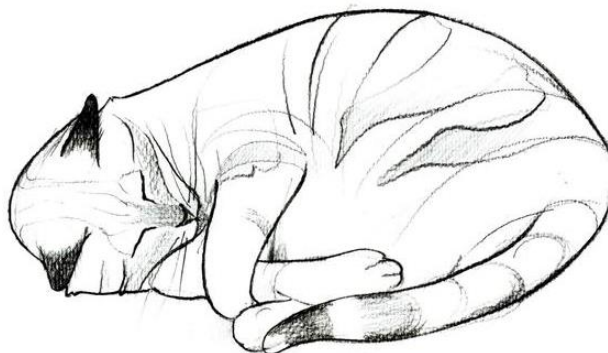
try to figure out the specific things that are interfering with their sleep, because these are different for different people. When a person is having difficulty sleeping, we recommend that they ask themselves what might be interfering with their sleep and trying to fix or change those specific things rather than choosing random strategies to try.

**Many people who have difficulty sleeping find it helpful to ask themselves:**

- Is my bedroom dark? Quiet? Cool?
  - Is something waking me up at night? (pets, family members, vibrating phone, etc.)
- Do I go to bed and get out of bed at the same time every day?
- Am I going to bed at a time when I feel sleepy, or do I actually get sleepy at a different time during the evening that might be a better bedtime?
- Do I do things around bedtime that might make me feel awake?
  - e.g. exercising, being around bright lights or electronic devices, watch the news or suspenseful TV shows, reading thrillers, taking a hot bath, consuming caffeine/alcohol/nicotine, etc.
- Do I spend time in bed when I am not sleeping?
  - Are there activities I typically do in bed (reading, relaxing, watching TV, meditating, stretching, etc.) that might be better to do somewhere else?
  - Do I get out of bed at night if I have been awake for more than 20 minutes?
- Do I take naps that are longer than 20 minutes?
- Do thoughts or worries keep me awake?

When people have difficulty figuring out what might be interfering with their sleep, it can often be helpful to see a sleep specialist. People in this situation often also find it helpful to try some of the general strategies described below to see whether any of these changes improve their sleep.

It's important to note that whenever someone makes a lifestyle change (such as changing their bedtime, their exercise routine, their diet, etc.), **it usually takes a couple of months to notice whether those changes are having a positive impact.** People often make the mistake of trying a new strategy for a week or two, deciding it isn't working, and giving up on it – and unfortunately, it's quite possible that they haven't stuck with the change long enough to notice results. When people make changes to their sleep-wake routines, we recommend sticking with the change for at least two months before deciding whether the change seems like a worthwhile practice to continue.



# Seven Key Strategies for Strengthening Sleep

## 1. Limit Time in Bed (Sleep Restriction)

One of the most effective ways to treat sleep problems is to increase the body's need to sleep (sleep pressure). This can be done by limiting the amount of time spent in bed. The longer a person is awake during the day, the stronger their sleep pressure becomes. People with sleep problems often nap or spend too much time in bed (awake) trying to sleep, which reduces their sleep pressure, and makes insomnia worse. When a person limits the amount of time they spend in bed, and begins staying in bed only for the amount of time they actually tend to sleep at night, their sleep typically improves.

*How to decide how long to stay in bed (using sleep restriction):*

First, estimate total sleep time (TST): the time you spend **asleep** during the night. Note that people with sleep problems tend to under-estimate how much sleep they actually get – so people who think they get two hours of sleep per night usually get closer to 4-5, especially if they are highly functional. After estimating TST, use the formula below to calculate a Time in Bed (TIB) allowance:

**Formula:** TIB Allowance = TST/0.80

**Example:** TST= 6 hours/0.80, so TIB Allowance = 7.5 hours

It is recommended that a person never spend less than 4.5 hours in bed if they want to get a good night's sleep. So if a calculated TIB Allowance is less than 4.5, ignore it and stay in bed for 4.5 hours instead.

After calculating Time in Bed Allowance (the amount of time to stay in bed each night), it's time to choose a bedtime. Bedtime should be the time in the evening when the body seems to be getting sleepy or preparing for sleep (feeling more relaxed, temperature dropping, breathing slowing down). A person's ideal bedtime is the time at which they can fall asleep within 20 minutes of going to bed. Some people find that they can't fall asleep within 20 minutes no matter what time they go to bed. In this case, a person should choose a convenient bedtime. No matter what bedtime a person chooses, it's important to be consistent and go to bed at the same time every night.

People practicing Sleep Restriction should set an alarm to wake them up at the end of their Time In Bed Allowance. They also need to commit to getting out of bed and starting their day when their alarm goes off – knowing that it might be really hard to do this. People are also encouraged to do things to keep their bodies and minds active and alert during the day. This might include having a cup of coffee, playing the radio or music, keeping bright lights on, getting out into the sun, going for a walk, etc. This helps program a person's circadian rhythm so it learns to make them feel alert when it's time to wake up.

### **Benefits of Sleep Restriction:**

- Falling asleep faster and staying asleep longer
- Spending less time spent in light sleep, and more time in deep sleep
- Reduced thinking & worrying at bedtime and throughout the night

When a person is trying Sleep Restriction, and they notice their sleep beginning to improve (i.e. they notice they are falling asleep more quickly and staying asleep longer during the time they are spending in bed),

guidelines recommend that they increase the amount of time they are spending in bed by 15 minutes every few weeks, until they reach an amount of sleep that they are satisfied with.

The most common side effects of sleep restriction are increased daytime sleepiness and headache. These side effects lessen once the body has gotten used to spending less time in bed.

**Please Note:** As mentioned before, when a person makes changes to their daily routine, it can take some time to see if it is working – sometimes up to 2 months. Using Sleep Restriction consistently can lead to rapid improvements in sleep. **However, if the strategy causes distress, it should be discontinued.**

## 2. Keep a Consistent Sleep-Wake Schedule

Consistent routines help our bodies plan and react to daily events. If a person goes to bed and wakes up at the same time every day, their body begins to learn what time it should get sleepy, and what time it should wake up. People often find that choosing a consistent bedtime and wake time (even on weekends!) really helps their body begin to feel sleepy and alert at times that support good sleep rather than interfering with it.



A consistent bedtime routine can also help the body learn when to begin making a person feel sleepy. When a person tends to feel very alert around bedtime, they often find it helpful to create an hour-long routine of activities that are done in the same order before bed (brushing teeth, changing clothes, reading, etc.) so that these activities begin to signal their body that it is almost time to go to sleep.

## 3. Control Exposure to Darkness & Light

One of the cues our body uses to decide when to make us sleepy and when to make us feel alert is how bright the light is around us. Our sleep-wake cycle is meant to roughly correspond to the day-night/light-dark cycle created by the rotation of the Earth, meaning that we are meant to feel sleepy when it is dark (nighttime), and alert when it is light outside (daytime).



In the modern world, people tend to surround themselves with artificial lights when it is dark outside, and these can interfere with the body's internal cueing system. People often find that if they are exposed to bright, blueish-whitish light, it makes them feel alert, whereas a dimmer, yellowish light makes them feel sleepy. This can be used to our advantage – for example, if we expose ourselves to the bright light in the morning, it can help us feel alert and awake. If we expose ourselves to that type of light (which is emitted by smartphones, computers, tablets, TV's, etc.) in the evening, it can prevent us from feeling sleepy when we want to go to bed. Many people find that reducing their evening/nighttime exposure to bright light can help them feel sleepy around bedtime, and that increasing their exposure to bright light in the morning and throughout the day can make them feel less tired and more alert during the day.

## 4. Limit Substance Use

**Smoking:** Nicotine is a strong stimulant, and although people tend to feel relaxed while they are smoking, the nicotine actually increases their alertness and can make it difficult for them to fall and stay asleep during the night. Smoking can cause multiple awakenings, shallow sleep, and daytime fatigue.



People who smoke often find it helpful to create a wind-down routine at night that does not include smoking. This sort of routine might include a cup of tea, a warm bath or other relaxing activities like meditation, deep breathing, praying, doing a puzzle, reading a light book, etc. People often notice that their sleep improves if they avoid smoking within the two hours of going to bed, and if they don't smoke when they wake up during the night.

**Alcohol:** If alcohol is consumed shortly before bedtime, it does tend to make a person fall asleep faster. However, alcohol is very disruptive to sleep during the night – it can suppress REM sleep, especially in the first half of the night, and results in light, patchy sleep and frequent awakenings during the second half of the night. Additionally, people build up tolerance to alcohol (and the feelings of sleepiness it can trigger) very quickly, so consuming alcohol to try to get to sleep at night tends not to work for long.

People who consume alcohol often find it helpful to have their last drink of the day 4-6 hours before going to sleep, so the body has enough time to metabolize (digest) the alcohol before they go to sleep.

**Cannabis:** Cannabis decreases REM sleep during the night (which can cause mood to worsen), and can cause increased sleepiness during the day. Cannabis can also increase the time a person spends in bed, making it difficult to feel awake and get started in the morning.

People who use cannabis often find it helpful to avoid using it within two hours of going to bed, and to refrain from using it when they wake up during the night.

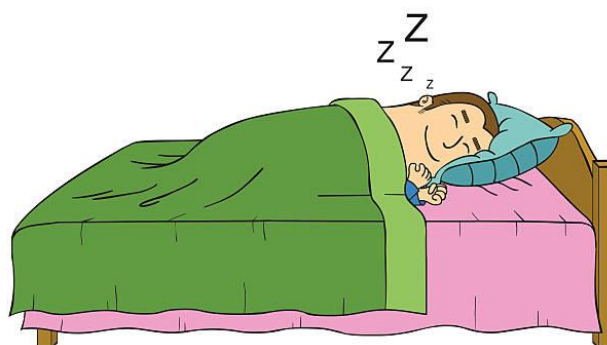
**Caffeine:** Caffeine blocks the chemical receptors in the brain that are needed to build up sleep pressure and help people fall asleep easily. Many people are unaware that caffeine can have an effect up to eight hours after consumption, especially for those with increased sensitivity.

People who consume caffeine often find it helpful to have their last caffeinated drink in the early afternoon. People often find it helpful to consume decaffeinated coffee or herbal tea as a substitute.

**Sleep Medication:** Sleep medications work best when used for a short amount of time (current recommendations are 7-10 days). Every sleep medication that is currently in widespread use has at least one negative effect on sleep. Cognitive Behavioural Therapy for Insomnia (CBT-I) and the strategies discussed in this booklet are more viable long-term approaches for treating sleep problems.

## **5. Use Bed & Bedroom for Sleep Only**

Bedrooms should be quiet, relaxing environments that encourage a person's brain to associate their bedroom and bed with sleep. People who have sleep problems and people with long-term pain often wind up teaching their brains that their bed and bedroom are places to stay awake, if they spend time in bed or in their bedroom doing things other than sleeping (such as resting, practicing relaxation strategies, doing exercises, watching TV, reading, etc.) This can interfere with sleep, because the brain forgets that bed is a place where sleep is supposed to happen.

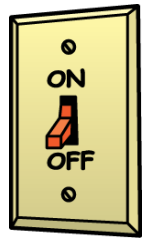


To remind the brain that bed is a place for sleep, many people who lie awake for long periods at night find it helpful to follow the “20 Minute Rule”:

- Get out of bed (and the bedroom) if unable to fall asleep after 20 minutes of lying awake
  - Go to another room and do something relaxing and pleasant. Keep the light level low – don’t turn on bright lights or electronics
    - Try doing something “boring” like reading a textbook or instruction manual
    - Try some relaxing activities, like working on a pleasant hobby (knitting, whittling, jigsaw puzzles, etc.), listening to peaceful music, looking through a picture book, or spending time with a pet
- Return to bed when feeling ‘sleepy’
- Repeat this step as often as necessary throughout the night

## 6. Turn Off Unhelpful Thoughts

We are always thinking and yet we are not always aware of our thoughts. When we are busy or distracted during the day, we are often less aware of our thoughts. However, when we lie down to go to sleep, thoughts (good and bad) seem to pop up out of nowhere, and it is easy to get caught up in worries or problem solving. Many people who experience this find it helpful to develop strategies to help ‘turn down the dial’ on thoughts that interfere with sleep, allowing sleep to come more peacefully and naturally.



Some strategies that can help reduce unwanted thoughts at night include deep breathing, progressive muscle relaxation, guided imagery, meditation, prayer, counting sheep, writing down thoughts in a journal, etc.

Another strategy that can help reduce unwanted night time thoughts involves restricting the time spent in bed. When this is done, the body and mind realize that there is limited time available for sleep. So, instead of getting caught up in unhelpful thoughts, the body and mind slip into a quiet rest.

## 7. Keep Body Temperature Low

Changes in body temperature are one of the main cues our bodies use to decide when it’s time to fall asleep, and when it’s time to wake up. Body temperature naturally drops around bedtime and while we are asleep. Activities like evening exercise and warm baths raise a person’s body temperature and prevent the body from going into its natural “sleepy mode.” Being too hot at night (due to room temperature, blankets, pets, sleeping with a hot water bottle, etc.) can have the same effect. Keeping the body and bedroom at cool temperatures around bedtime and during the night helps many people fall asleep and stay asleep.

People with long-term pain often find it helpful to use a pain self-management strategy before bed, and many people’s “go to” strategy is to take a hot bath or use a heating pad. While these strategies are good ideas during the daytime, it can be helpful to use different strategies at night (such as deep breathing, mindfulness, progressive muscle relaxation, TENS, etc.), to prevent an increase in body temperature from interfering with sleep. People who really benefit from using heat as a pain management strategy may find it more helpful to use a small heated device like a heating pad or hot water bottle for no more than 15 minutes in the evening, rather than using a larger heat source or applying heat for longer periods of time.



## Other Strategies for Improving Sleep

- Try to be active during the day and more sedentary/still during the evening, to let the body know when it is time to be energetic and alert, and when it is time to settle down.
- Change timing of medications to reduce alertness at bedtime & during the night. Many medications have the side effect of making people feel more alert and awake. People often find it helpful to talk to a doctor or pharmacist about their medications to find out whether any might be interfering with sleep, and if so, whether the dose or the timing of their medications can be adjusted to help them sleep better.
- Have a list of relaxing activities to do instead of lying in bed awake.
- Consider sleeping alone if a family member or pet is making it difficult to sleep.
- Try some relaxation strategies to help kick start sleep – either at bedtime, or after waking up at night. Some relaxation strategies include deep breathing, progressive muscle relaxation, guided imagery, mindfulness, counting backwards from 100, and counting sheep.
- Don't eat too close to bedtime – especially foods the body needs to work harder to digest, or things that might bother the digestive system or cause the body to feel energetic/alert (such as alcohol, spicy foods, sugary treats, heavy/large meals, caffeine, etc.)
- Schedule bedtime for the time when you feel most sleepy or relaxed. Go to bed and wake up at the same time every day – including weekends.
- Make the bedroom dark, cool, comfortable & quiet.
  - Try blackout curtains to keep the room dark
  - Keep the temperature cool, and layer blankets to make it easy to adjust body temperature
  - Use a comfortable, supportive mattress and pillows
  - Turn clocks around so it's not possible to see the time from bed. Don't keep electronic devices such as smartphones in the bedroom.
  - Reduce noise
    - Some people like to play white noise at night – this is okay and can help block out other sounds.
  - Reduce disturbances & distractions from pets, family members, electronic devices, outdoor lights/sounds, etc.
  - Keep activities that can cause worry or keep the mind awake/alert, such as watching TV, using electronics, paying bills, exercising, and using a computer, out of the bedroom
  - Make the bed & bedroom a space that feels relaxing and comfortable. Some people find it helpful to try cozy pajamas and sheets/blankets, teddies, uncluttering their bedroom, increasing privacy, painting or decorating their room to make it feel more calming & serene, etc.



When people are trying to improve their sleep, it's important to address the things that are interfering with their sleep rather than just trying general strategies.

## Myth Busting

People often have beliefs that prevent them from solving sleeping problems.

### ***MYTH #1) Adults need at least 8 hours of sleep every night***

The average adult sleeps 7.3 hours per night, but because this is an average number, some people sleep much longer, while others sleep for less time. Recent sleep research suggests that 6-7 hours of sleep per night is enough for most adults.

### ***MYTH #2) If I don't sleep well tonight, I will be a wreck tomorrow***

It's true that a poor night's sleep can make a person feel tired the next day, but most people overestimate how much they are affected by poor sleep. Studies show that people with insomnia perform much better on tests than they predict they will – i.e. their cognition is better than they think it is.

### ***MYTH #3) If I wake up several times at night, I'm not getting a good night's sleep***

Many people believe that sleep is an all-or-none phenomenon – that a person is either awake or sleeping deeply. Many people also believe that it is normal to sleep deeply the entire night. These beliefs reflect misunderstandings about sleep; cycling through the stages of sleep throughout the night naturally results in 4 or 5 brief awakenings per night.

### ***MYTH #4) I am losing control of my ability to sleep***

People often have the notion that they should be able to exert some sort of control over their sleep. In fact, sleep is a natural function that does not require any special effort – other than providing good sleep conditions, such as having a quiet, dark, bedroom, and keeping a regular sleep schedule.

### ***MYTH #5) My pain is what's keeping me awake, so my sleep isn't going to improve unless my pain improves***

Although people with long-term pain often think that their pain wakes them up at night, people actually don't experience pain while they're sleeping. It is normal for people to wake up several times per night, in between sleep cycles. Most people don't really remember these nighttime awakenings, because they fall back to sleep quickly – but when a person has long-term pain, they tend to experience pain as soon as they wake up, making it hard for them to fall back asleep, and making them feel like pain is what woke them up.

Studies of people with long-term pain show that there isn't a very strong relationship between a person's sleep quality and their pain level. However, there is a strong relationship between sleep quality and a person's level of alertness at bedtime. This is good news for people with long-term pain who want to improve their sleep – even if a person is in a lot of pain, if they can do things to help them feel sleepy at bedtime and when they wake at night, they can get a good night's sleep despite long-term pain.