

Fatigue Risk Management Info sheet: How to adjust my daily routines to improve sleep



Why read this?

It is estimated that 87% of the population are not thriving because work, lifestyle, and social activities are out of sync with the natural daily cycle of daytime and night time.¹ People working office hours often go to bed late because they're working or watching television, and they set an alarm in order to get to work on time. At the weekend we tend to sleep later and get more sleep. We may stay-up late socialising and not set an alarm and so wake later too. Shift workers also have variable sleep times due to early starts, late finishes, night duties, extended hours and due to being on call.

The difference in the timing of our sleep on workdays versus free days causes 'social jetlag'², which is similar to the jetlag we experience when we cross time zones. Social jetlag contributes to low mood and obesity, and has been associated with decreased physical and mental health and performance. Consequently, during the day we feel tired and sluggish, and do not feel sleepy at bedtime and can't fall asleep until much later.

This information sheet is for office workers and shift workers and describes the daily lifestyle patterns or routines we can use to cope with social jetlag and improve sleep. Advice on daily routines with reference to light exposure, meals and exercise is provided.

The Body Clock: light

The natural 24h cycle of light during the day, and darkness at night, is a strong signal received by the body clock. In response to darkness in the evening, the pineal gland releases the hormone melatonin, which communicates to the rest of the body that it is time for sleep. If light and dark signals are weak, for example when we spend daytime indoors in dim lighting, or variable, for example switching on a bright light multiple times at night to go to the bathroom, our body clock can't keep in sync with the natural daily cycle of light and darkness.

Research has shown that being exposed to bright light just before bedtime causes us to fall asleep later. The light signal is transmitted from the retina in the eye to the brain via sensitive light sensors called melanopsin.³ Once melanopsin is activated, it communicates to the body that it is time to be active, and not to sleep.

Although light appears to be white, it is actually made up of the full spectrum of colours, hence why we see a rainbow when sunlight shines through rain and is split into the full spectrum of colours. The colour of light is determined by the wavelength – longer wavelengths appear red to us, while shorter ones appear blue. Unlike artificial light, natural light is full spectrum and dynamic. This means that natural light contains all the colours of the rainbow and the intensity and mix of colours change with the time of day, from mostly bright blue light during the day, to soft red light in the evening. As melanopsin is most sensitive to blue light, the colour predominantly emitted by smartphone screens, using these and similar devices, has a particularly potent effect on sleep.

What to do

1. Reset your body clock - Go camping!

To sleep well, we need to sleep in sync with the natural timing of darkness night and light during the day. A camping trip is a fun way to re-sync your body clock and improve your sleep. A study found that when students were taken camping for a weekend in the Rocky Mountains, with only light from a campfire in the evening and total darkness at night, they went to bed 2.5 hours earlier and slept for longer. Even just a weekend camping trip caused the timing of the body clock to correct by a 69%, and a weeklong camping trip completely re-synced the body clock.⁴

2. Spend at least an hour outside every day

The intensity of light in an office tends to range between 80 - 1000 lux, which is not necessarily strong enough for our body clock to register time spent in an office environment as daytime. Outside light intensity varies between 100,000 lux on a sunny day to 1000 lux on a cloudy day. Regular exposure to natural light during the morning hours will help you feel sleepier in the evening. Try to spend at least an hour a day outside, in the morning and before lunch. Don't wear sunglasses unless it is very bright. A study found that daytime office workers who received bright light in the morning fell asleep more quickly and slept for longer and had a better mood than office workers exposed to low light levels.⁵

If you are exposed to bright light during the day on a regular basis you will also be more resilient to light exposure in the evening. In other words, exposure to sunshine is a strong signal to the body clock that it is daytime, which provides a degree of protection from the potential negative impact of exposure to artificial light at night. If you work early shifts and want to go to sleep earlier, make sure you get plenty of bright light in the morning, for example walk part of the journey to work. If you are working a late shift, spend time outside later.

3. Before sleep: Avoid bright light, switch off devices, and allow time to wind down

As well as taking the occasional camping trip, everyone should avoid exposure to bright light before sleep.

Some devices have a 'night setting' which automatically dims the screen in the evening. However, as well as emitting blue light, electrical devices keep your mind engaged. Responding to emails and texts and being on social media are not 'relaxing' activities. In order to fall asleep our mind needs to 'wind down' or 'switch off' so avoid using electrical devices, and dim the lights, 1-2 hours before bedtime. This is particularly important if you are working early shifts. .

1 to 2 hours before bed try doing something relaxing and enjoyable. Try reading a book using a reading lamp with a yellow glow rather than a white or blue light, listen to calming music or practise relaxation exercises. If you have a 'racing mind' try using the strategies provided in 'How to adjust my beliefs and thoughts about sleep'.⁶ Writing a diary or making a plan of the things that you would like to do the following day may stop these thoughts popping up when you are in bed.

4. Late or night shifts: light exposure (and napping)

If you work late or nightshifts and want to sleep better during the day and feel more alert on shift, try to experience light exposure in the evening. For example, try to go outside in the evening to exercise, or eat your evening meal in bright light. Before lunch, try to limit your light exposure. If you must go outside, for example when catching the bus home after a night shift, wear dark sunglasses.

A nap in the afternoon has been shown in many studies to be very beneficial for alertness. A study showed that compared to people who slept in one bout between night shifts, those who split their sleep obtained more total sleep and were more alert.⁷ The people who split their sleep between nightshifts had a 5-6 hour sleep in the morning and a second sleep of 2-3 hours before the night shift started.⁷ One challenge with this approach is trying to fit in napping before a night shift with a busy home life.

5. Get some physical activity every day

Outdoor exercise has the dual benefit of getting you your daily 'dose' of sunshine and the benefits of physical activity. Exercise helps people fall asleep more quickly, improves sleep quality and reduces levels of anxiety and depressive symptoms. 2,600 men and women, ages 18-85, found that 150 minutes of moderate to vigorous activity a week, which is the national guideline (USA), provided a 65% improvement in sleep quality.⁸ Moreover, they reported feeling less sleepy during the day, compared to those with less physical activity.⁸ Exercising at the wrong time can have the opposite effect, so you should not exercise vigorously two hours before bedtime.

6. Eat at regular times every day

Organs, such as the liver and the gut, are influenced by the body clock in the brain and have their own peripheral clocks. While the body clock responds to light and dark, the peripheral clocks respond to mealtimes. Darkness and fasting tell the body it's time to sleep, and light and eating tell the body it is time to be active. After the period of fasting that occurs at night when we are asleep, the timing of both the first ray of sunlight and the first bite are just as important in setting the timing of the peripheral clocks. To keep all of your clocks in sync, try to keep your mealtimes regular and limit your eating window to at least 12 hours. If you have your first cup of tea or breakfast at 7 am, try not to eat after 7 pm. For your final meal of the day, try to include protein and [complex carbohydrates](#) to help you to feel full and promote sleep.¹ Try to leave 3 to 4 hours between your last bite and going to bed for better digestion and sleep.¹

7. Keep similar bedtime on work and days off

To limit social jetlag, try to go to bed and wake-up at similar times on workdays and on days off. Depending on your work schedule and social and domestic responsibilities this will be more or less possible. If you can manage to align your sleep on work and rest days with your work schedule, research indicates that you should sleep better and for longer. This is easier if you are an office worker, and more difficult if you are a shift worker. If your shift pattern is variable, try to have a few hours of 'anchor sleep' during the night at the same time every day. This sleep can act to stabilise your sleep and the times you feel more or less tired. Of course, you will still need to top up your sleep at other times of day or night.

To summarise

Modern life, work hours, smartphones and artificial light, all impact our body clock. We are sleeping, eating and being exposed to light at the 'wrong' times, for example in the evening and well after the sun has gone down, we may work on a computer for hours and eat dinner very late. This makes getting up early for work difficult and causes social jetlag. To set your body clock to an earlier time, and help you sleep earlier and for longer, try not to have too much light exposure in the evening and try to sleep at similar times on work days and days off. If you are trying to adjust to nightwork, wear dark glasses on your way home to limit your light exposure. A weekend of camping is a fun way to rapidly reset your body clock.

What should I read next?

You may find the information sheets titled 'What is social jetlag'² and 'How to change your sleep habits in order to get more sleep'.⁹ of particular interest.

References

- 1 Panda, S. (2018). *The Circadian Code: Lose weight, supercharge your energy and sleep well every night*. Random House.
- 2 Ruscitto, C., & Holmes, A. (2019). What is social jetlag? London. Available at : <http://www.clockworkresearch.com/what-is-social-jetlag/>
- 3 Hattar, S., Liao, H. W., Takao, M., Berson, D. M., & Yau, K. W. (2002). Melanopsin-containing retinal ganglion cells: architecture, projections, and intrinsic photosensitivity. *Science*, 295(5557), 1065-1070.
- 4 Stothard, E. R., McHill, A. W., Depner, C. M., Birks, B. R., Moehlman, T. M., Ritchie, H. K., ... & Wright Jr, K. P. (2017). Circadian entrainment to the natural light-dark cycle across seasons and the weekend. *Current Biology*, 27(4), 508-513.
- 5 Figueiro, M. G., Steverson, B., Heerwagen, J., Kampschroer, K., Hunter, C. M., Gonzales, K., ... & Rea, M. S. (2017). The impact of daytime light exposures on sleep and mood in office workers. *Sleep Health*, 3(3), 204-215.
- 6 Ruscitto, C., & Holmes, A. (2019). How to adjust my thoughts and beliefs about sleep. London. Available at : <http://www.clockworkresearch.com/publications/>
- 7 Willeumier, F. D. (2017). *The effect of the innovative split-sleep schedule on objective and subjective sleep in nurses working night shifts* (Master's thesis).
- 8 Loprinzi, P. D., & Cardinal, B. J. (2011). Association between objectively-measured physical activity and sleep, NHANES 2005–2006. *Mental Health and Physical Activity*, 4(2), 65-69.
- 9 Ruscitto, C., & Holmes, A. (2019). How to change my sleep habits in order to get more sleep. London. Available at: <http://www.clockworkresearch.com/publications/>

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Our Fatigue Risk Management Team help organisations manage the risks associated with fatigue and workload and specialise in delivering fatigue risk management solutions for companies whose employees are involved in safety critical work, such as aviation, the petrochemical industry, road transport and the emergency services. Their work provides organisations with the evidence needed to ensure that the business is operating within an acceptable risk threshold.

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