Sleep…

Delivered on behalf of
worcestershire
county council

Aims

1. Why do we sleep
2. How much sleep do we need?
3. Sleep deprivation impact
4. Strategies

No judgements!

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Sleep

- Sleep is universal in animals (even in insects and worms) – this alone suggests a vital function
- Adult humans in general need 8 hours of sleep to function optimally.
  - A lot of us are disguising their sleep deprivation.
  - Remember… you're very bad at objectively assessing your decrease in performance under sleep deprivation.

Interesting Sleep Facts

- The amount of sleep in animals per day varies from 4 hours in elephants to 19 hours in bats. There are no strong correlations between animal characteristics and amount of sleep, though brain complexity relative to body size increases sleep.
- Among animals, REM sleep occurs only in birds and mammals.

Interesting Sleep Facts

- Cetaceans (dolphins, whales) sleep with half their brain at a time. They also don't have REM sleep (as formally defined), since the muscle atonia would prevent swimming. But they may have some harder to detect REM variant.

- Birds in a flock will have most birds in full-brain sleep, then birds in the perimeter sleeping with half their brains to stay alert for danger

- Similarly, humans in a new environment (eg hotel room) show one half of the brain sleeping lighter than the other, wary of dangers. This is why the first night in a new environment can be so unrestful. This effect dissipates with more time.

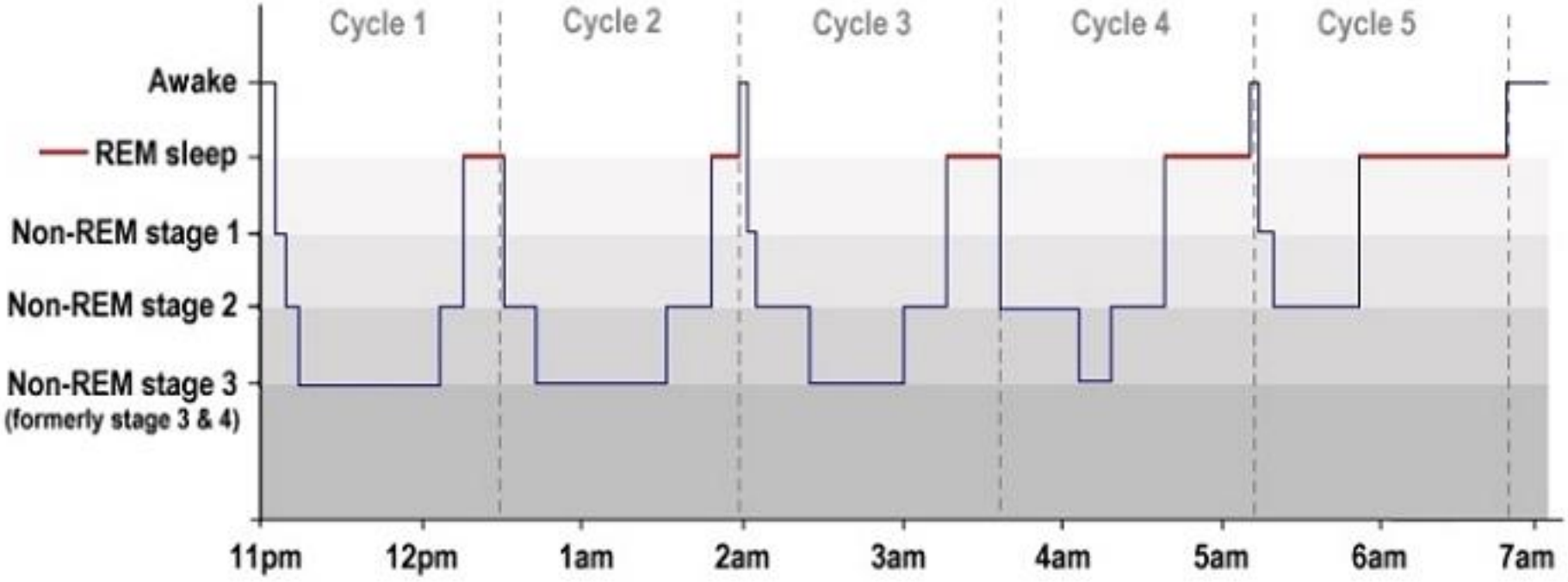
- Transoceanic birds that cross thousands of miles have ultra-power naps, sleeping for seconds at a time.

Sleep deprivation

- Sleep deprivation shows consistently worse outcomes. Nothing is reported to be beneficial from sleep deprivation.
  - higher mortality, risk of cancer, heart disease, weight gain, rate of infection, Alzheimer's, irritability, inflammation.
  - lower productivity, social fluidity, rational decision making, memory recall, emotional control, testosterone, immune system function, response to flu vaccine.
  - in the extreme, chronic sleep deprivation causes death.
  - even the apparent increase in wakeful time to be productive is balanced by lower productivity and creativity.

Sleep states

- Sleep has two general types – NREM and REM.
  - NREM occurs earlier in the sleep phase, while REM is concentrated later.
  - NREM is slow (~2Hz) (like billions of neurons singing in synchrony) while REM is fast (50Hz) and looks like being awake.



The Benefits of Sleep for the Brain NREM

- **NREM is responsible for pruning memories, transferring short-term memory to long-term memory, gaining "muscle memory,"**
- Sleep provides improvements in:
  - Long-term factual recall
    - The hippocampus stores short-term memory; the cortex stores long-term memory.
    - NREM sleep moves facts from the hippocampus to the cortex. Not only does this secure memory for long-term, but it also clears out short-term memory to make room for new information.

      - **Making up sleep later doesn't help recover previous days' memory – if you lost it, you've lost it.**

The Benefits of Sleep for the Brain - REM

- **REM is responsible for forming new neural connections, problem solving, dreaming, blunting emotional responses to painful memories, reading other people's facial emotions**
- During REM dreaming, your visual, motor, memory, and emotional areas of the brain are active. Your prefrontal cortex (governing rationality) is muted.
- In REM sleep, norepinephrine is reduced to zero, which possibly allows the brain to process upsetting memories in a "safe" brain environment.
  - Sleep deprivation reduces interpretation of the subtleties of facial expressions, causing the sleep deprived person to more likely interpret faces as hostile and aggressive

The Benefits of Sleep for the Brain REM

- The brain asks: **“how can I connect what I’ve recently learned with what I already know, thus discovering insightful revelations?** What have I done in the past that might be useful in solving this new problem?”

  - REM sleep creates higher-level comprehension of ideas, finding the patterns among the vast noise
    - eg language learning as a child; finding easier ways to solve repetitive problems
  - REM sleep creates novel connections, between distantly related concepts

Effects of sleep deprivation

- We know that a baby that doesn't get its nap time tends to get cranky. Adults are the same way.
- In sleep deprivation, the prefrontal cortex control of the amygdala (responsible for fear, anxiety, etc) weakens, leading to 60% less emotional effectiveness. The highs can be higher, and the lows lower.
- In children this often results in "manic" behaviours
- Attention difficulties
- Emotional outbursts
- Limited empathy and understanding

Recommended sleep times

- Below are the approximate hours of sleep needed by children of different ages, as recommended by the Millpond Children's Sleep Clinic.

1 week old	daytime: 8 hours	night-time: 8.5 hours
12 months	daytime: 2.5 hours	night-time: 11 hours
2 years	daytime: 1.5 hours	night-time: 11.5 hours
4 years	night-time: 11 hours 30 minutes	
5 years	night-time: 11 hours	
6 years	night-time: 10 hours 45 minutes	
7 years	night-time: 10 hours 30 minutes	
8 years	night-time: 10 hours 15 minutes	
9 years	night-time: 10 hours	
10 years	night-time: 9 hours 45 minutes	
11 years	night-time: 9 hours 30 minutes	
12 years	night-time: 9 hours 15 minutes	
13 years	night-time: 9 hours 15 minutes	
14 years	night-time: 9 hours	
15 years	night-time: 9 hours	
16 years	night-time: 9 hours	

Why autistic children might struggle to sleep

- having difficulty settling, winding down and going to sleep
- waking repeatedly during the night, or having difficulty getting back to sleep after waking up to go to the toilet
- increased anxiety or an inability to relax causing insomnia
- social cueing problems, where an autistic person doesn’t make the connection between others in the house going to bed and their own need to sleep

Why autistic children might struggle to sleep

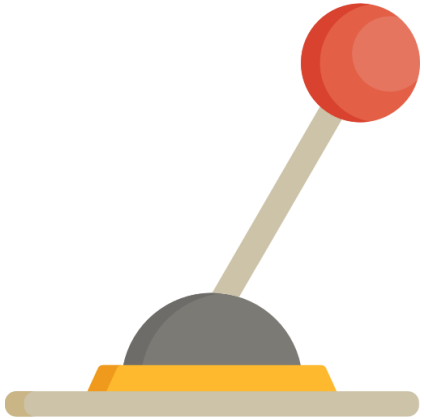
- irregular secretion of the sleep hormone melatonin, which regulates sleep patterns, or having atypical circadian rhythms (body clock)
- neurological conditions such as epilepsy
- sensory differences, such as increased sensitivity to blue light from smart phones, laptops and other screens, or sensitivity to certain sounds or white noise, which may be upsetting or distracting and keep them awake

Why autistic children might struggle to sleep

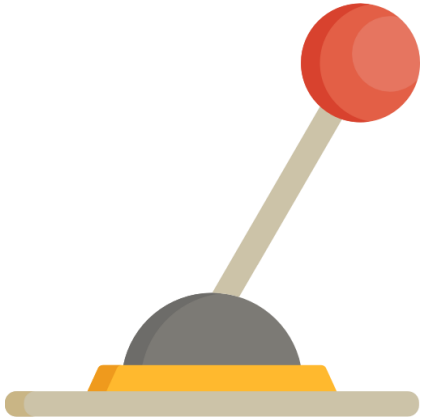
- problems caused by food allergies, which could cause gastrointestinal issues and discomfort, or increased sensitivity to caffeine or other stimulants, which can disturb sleep
- hypersomnia - sleeping too much. Increased exhaustion could be caused by the additional stress autistic people experience in social situations.

How to improve sleep
Three “levers” of sleep

Adenosine, which rises consistently through the day, and is depleted during sleep (makes you feel sleepy)



A **circadian rhythm**, regulated by **melatonin.** This responds to light and darkness (the “cue” to sleep)



Noradrenalin – can keep us awake with thoughts and worries

How to improve sleep

- 1. Stick to a sleep schedule

We should aim to go to bed and wake up at the same time each day. People generally have a hard time adjusting to changes in sleep patterns. Unfortunately sleeping late on weekends doesn't make up for poor sleep during the week. If necessary, set an alarm for bedtime. Sticking to a regular sleep schedule is the number one thing to insist upon to improve sleep.

- 2. Don't exercise too late in the day

Exercise is great, and we should try to exercise at least 30 minutes on most days. But try to time it no later than 2-3 hours before bed.

How to improve sleep

- 3. Avoid caffeine

Colas, coffee, teas and chocolate contain caffeine, which is a stimulant. Even consuming these in the afternoon can have an impact on your sleep.

- 4. Avoid large meals and beverages late at night

A light snack before bed is okay, but a heavy meal can cause digestive issues, which interferes with sleep. Drinking too many fluids can cause frequent awakenings to urinate.

How to improve sleep

- 5. Don’t nap after 3pm

Taking naps too late in the day can make it hard to fall asleep at night.

- 6. Make sure to leave time to relax before bed

It’s important to have time before bed to unwind. Try to schedule your days so that there is time to relax before bed.

- 7. Take a hot bath before bed

The drop in body temperature after a bath may help you to feel sleepy, and the bath can help you to slow down and relax before bed.

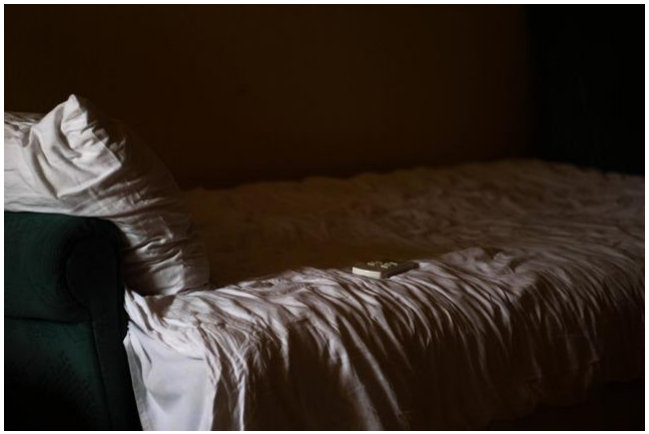
How to improve sleep

8. Get the right sunlight exposure

Sun exposure during the day helps us to regulate sleeping patterns. Try to get outside in the natural sunlight for at least 30 minutes per day.

9. Have a dark, cool bedroom

We sleep better at night if the temperature in the room is kept on the cool side. A comfortable mattress and pillow can set you up for a good sleep.



How to improve sleep

10. Have a gadget-free bedroom

Gadgets such as mobile phones and computers can be a distraction and the emitted light can halt the production of sleep-inducing chemicals. Those with insomnia will often watch the clock, turn it away from view so you don’t have to worry about the time while trying to sleep.

Thanks for listening

Any questions?

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