The Science of Better Sleep

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...zzzZ

Hi, I'm

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4th year Doctoral Student

Sleep Scientist

ex-poor sleeper

How happy are you with your Sleep?

Very unhappy!

My sleep is something that often troubles me.

Unhappy

I often think about my sleep and would like to improve it.

It could be better

I don't tend to think about my sleep a lot, but it isn't perfect and I want to improve it.

Happy

I rarely think about my sleep. I'm quite happy with it but am open to improving it

Very happy!

It's perfect and I wouldn't change. at thing!

Are you experiencing any sleep issues?

If so, please take a moment to write them down.

Try to be brief and use bullet points

Are you experiencing any sleep issues?

Current sleep schedule?

Feel refreshed?

Quality?

Amount?

worry?

Any wakeups?

time to get to sleep?

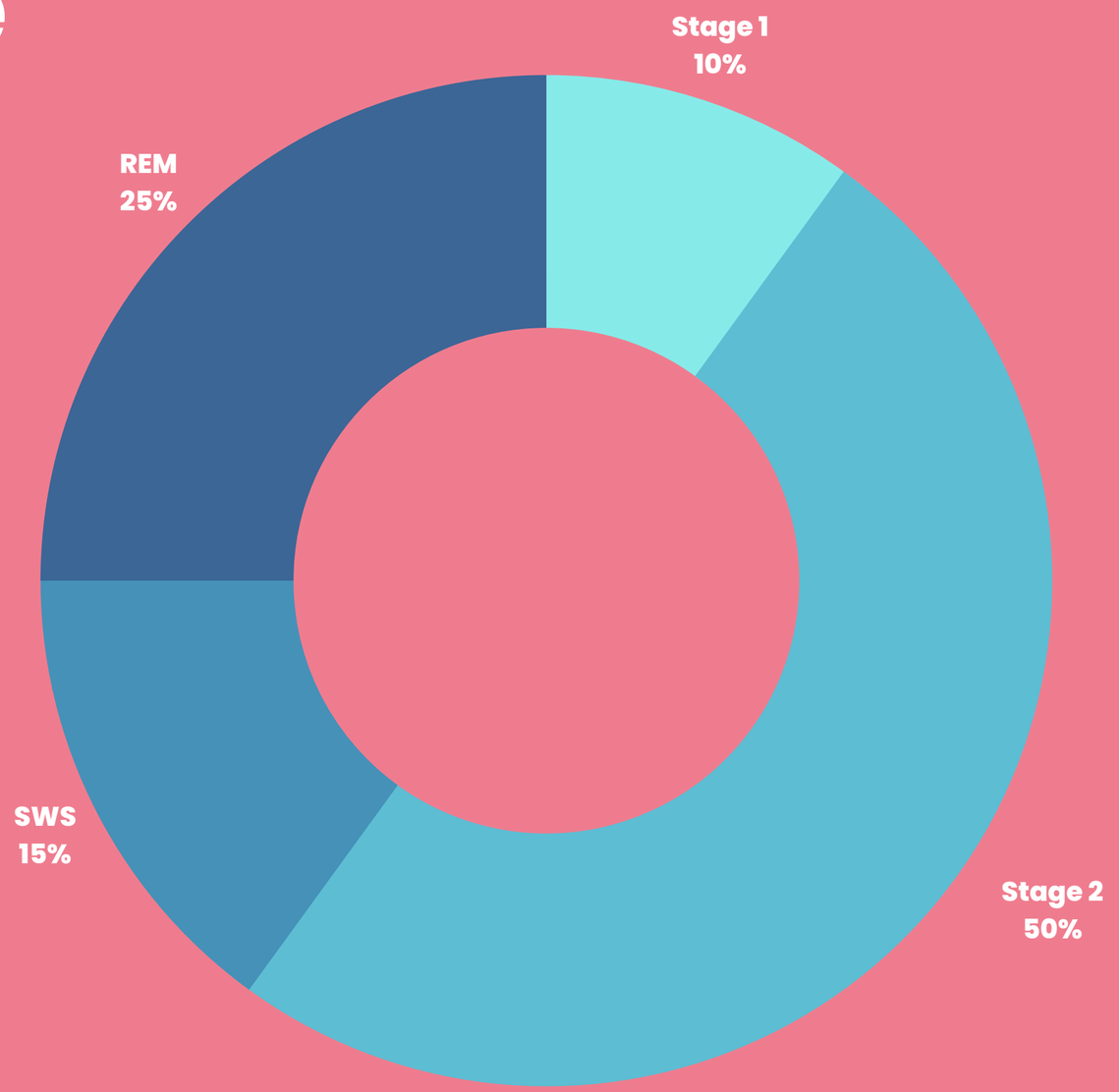
“Sleep is the golden chain that ties health and our bodies together.”

Thomas Dekker

The Science of Better Sleep

Sleep Architecture

- STAGE 1
- STAGE 2
- SLOW WAVE SLEEP
- RAPID EYE MOVEMENT SLEEP



EEG sleep stages

AWAKE →

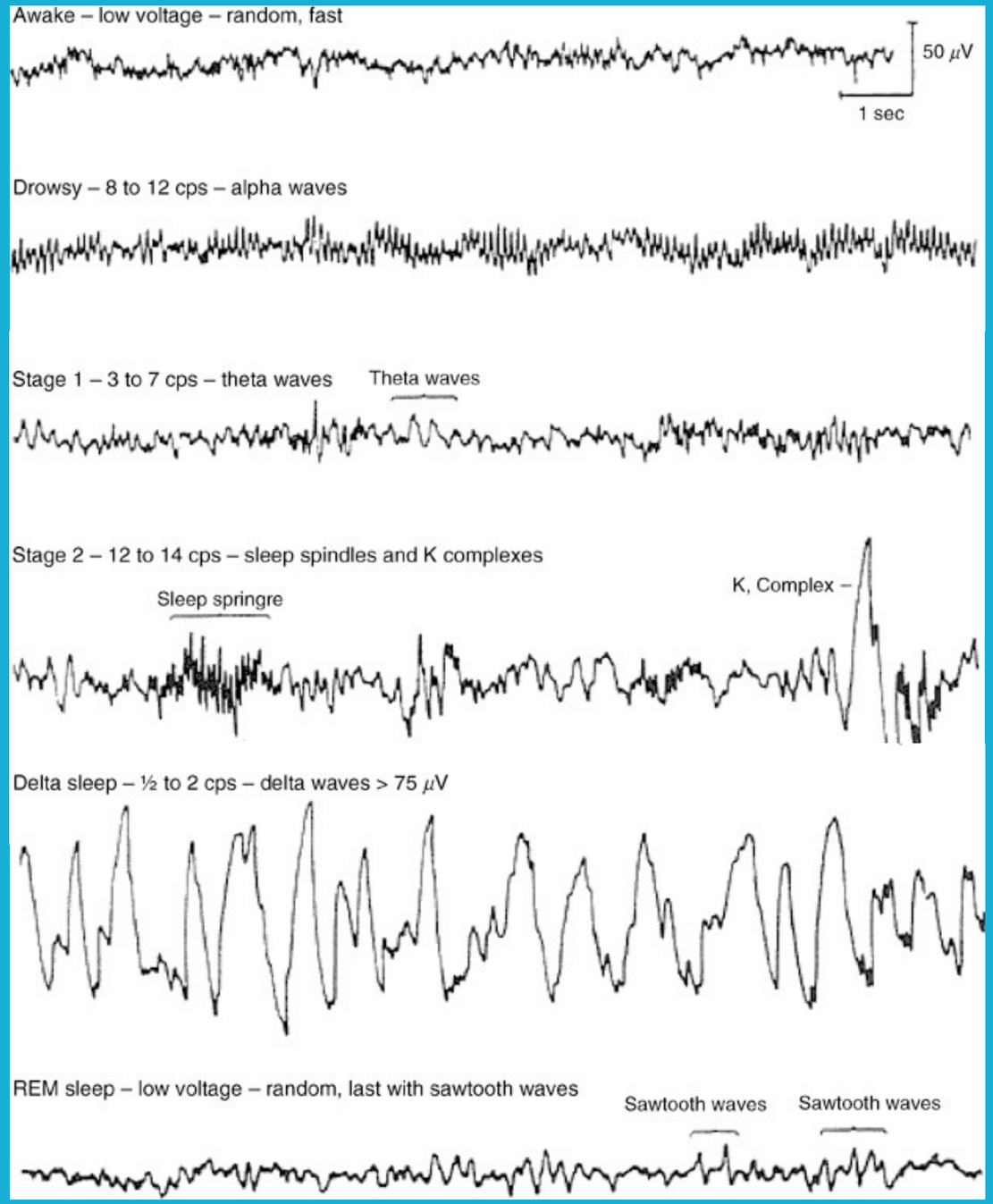
Drowsy →

Stage 1 →

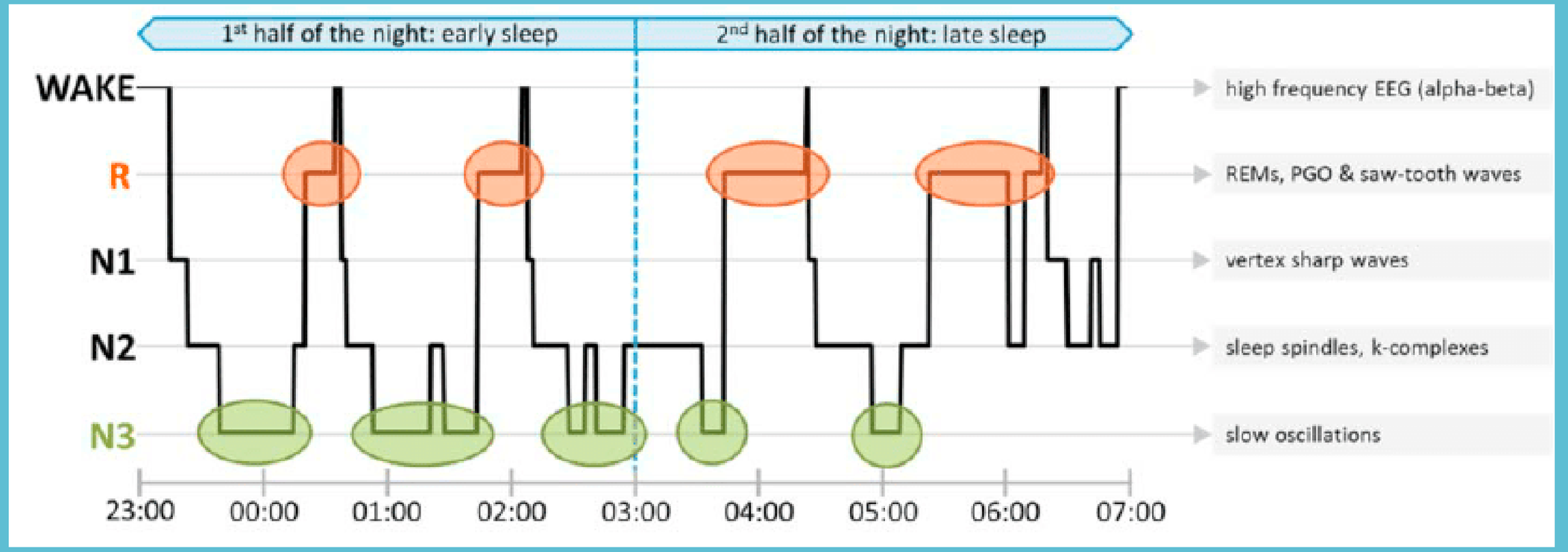
Stage 2 →

Slow wave sleep →

REM →

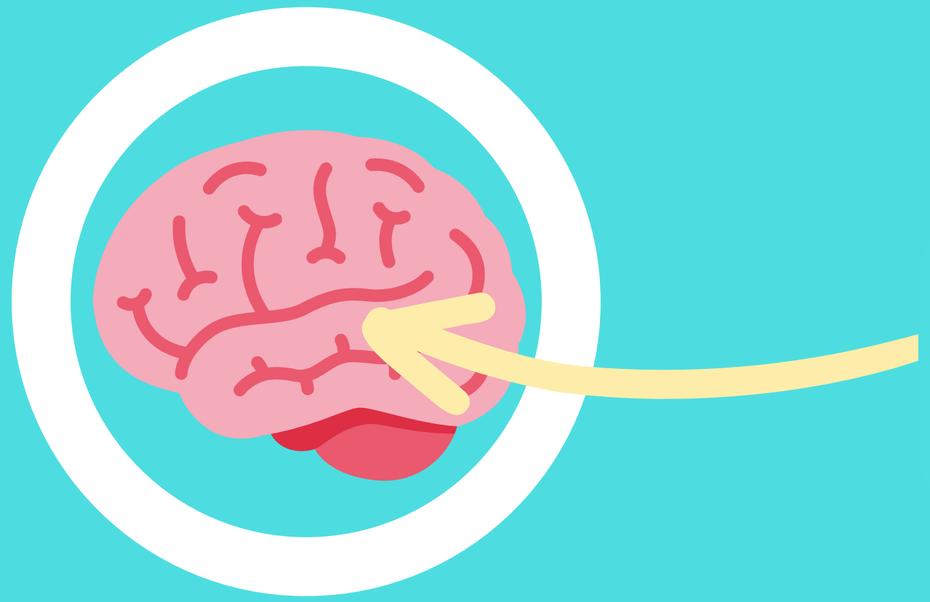


Hypnogram

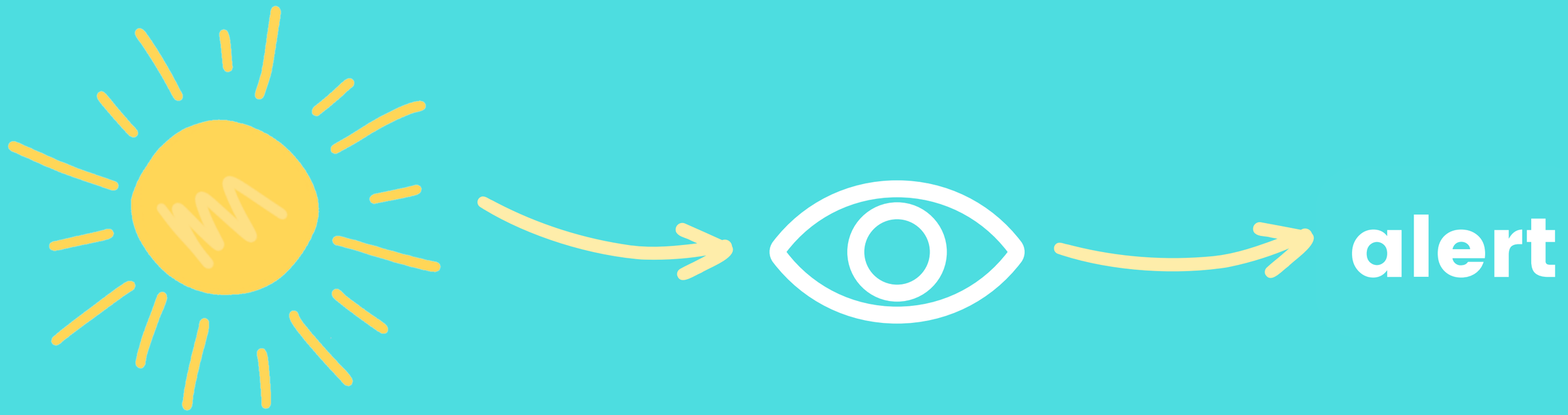


(Wislowska et al., 2014)

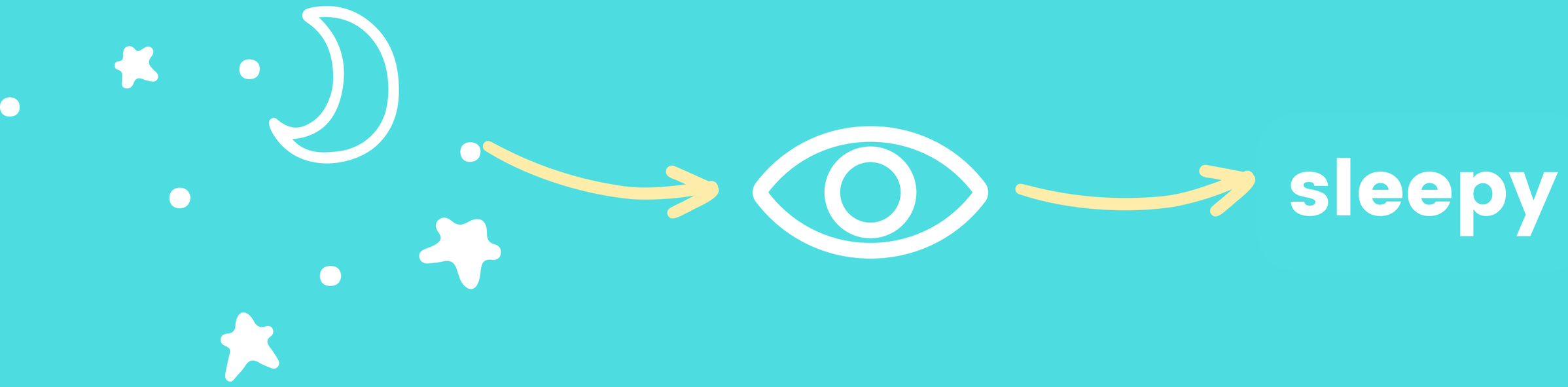
The Master Clock



The Master Clock

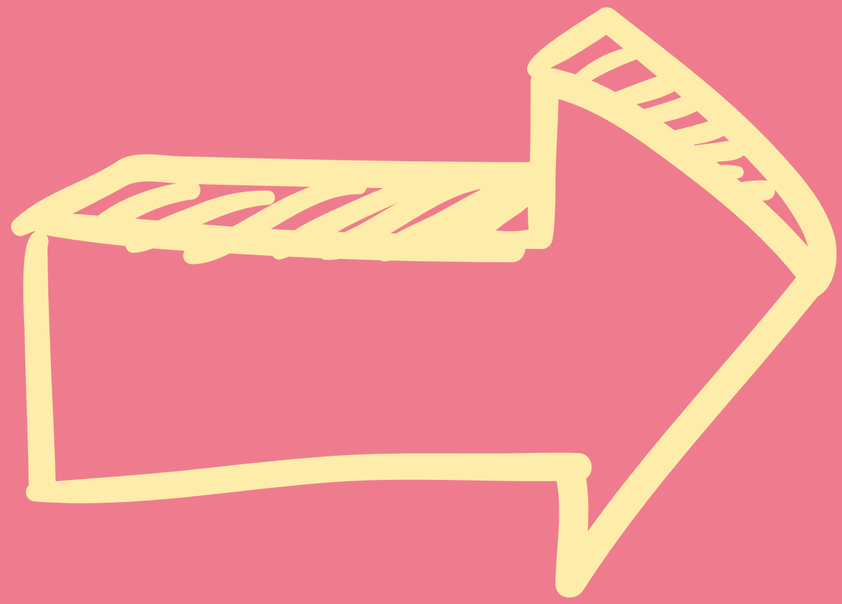


The Master Clock



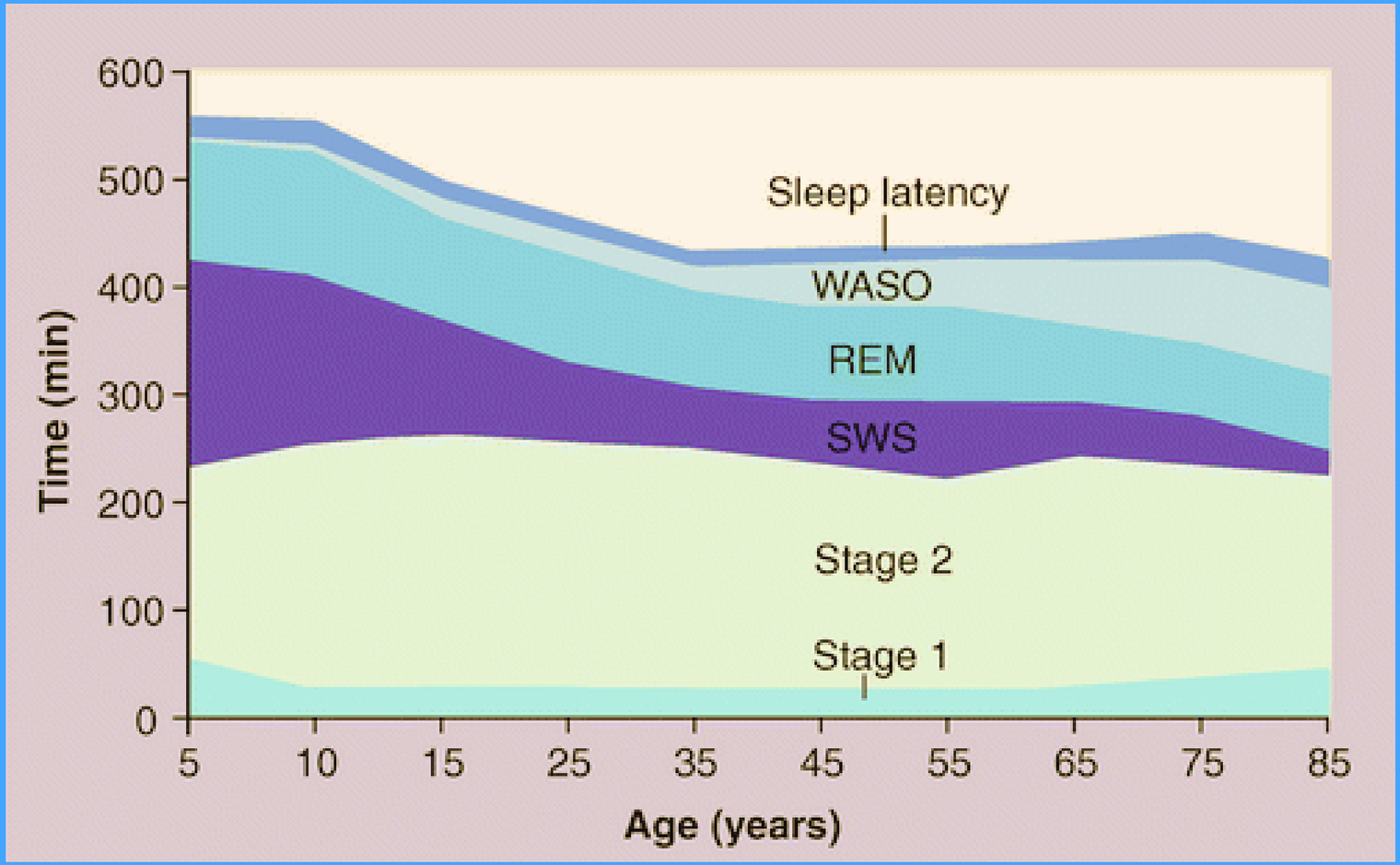
The Master Clock

Sleep and Dementia



Age and sleep

1.1 in 4 people living with dementia are likely to experience sleep disruption. It is very common.

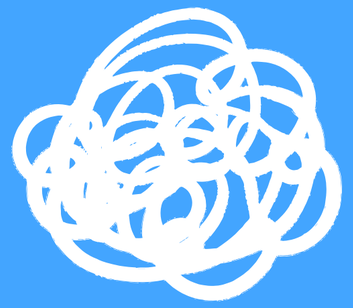


Adapted from: Ohayon et al., (2004)

38%

of 22,780 participants experiencing symptoms of sleep disturbance (PLWD in carehomes)

(Webster et al., 2019)



Distress, more severe cognitive and neuropsychiatric sysmptoms, caregiver burnout.

Poorer disease prognosis, accelerated cognitive decline.

Sleep Disturbances and RISK.

VASCULAR DEMENTIA

2x **INSOMNIA** [1]
(cardiovascular factors reduced IR, likely interacts)

1.23x **SLEEP-DISORDERED BREATHING** [2]

2.23x **OTHER SLEEP DISTURBANCES** [2]
include poor quality sleep and unclassified sleep disturbances

ALZHEIMER'S DISEASE

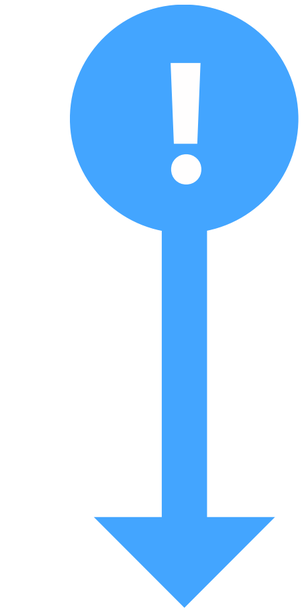
1.51x **INSOMNIA** [2]
12.14 yr follow up
(n=4627 with AD)

1.2x **SLEEP-DISORDERED BREATHING** [2]

1.76x **OTHER SLEEP DISTURBANCES** [2]
include poor quality sleep and unclassified sleep disturbances

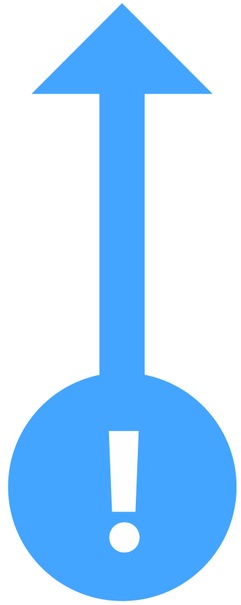
1 Baek et al., (2021)
2 Shi et al., 2018

SLEEP



SYMPTOM

RISK FACTOR



Managing sleep issues

- What was their sleep like before dementia?
- did they have a particular routine that worked for them?
- Are there particular things that specifically helped or didn't help? (e.g. music, reading, audiobook, evening routine etc)

Managing sleep issues

Daily Routine

- Schedule taxing activities in the morning when most alert (e.g. Dr appoint)
- Encourage a regular routine (e.g. waking up, meals, bed etc)
- If possible, include walks or time outside in sunlight
- Larger meal at lunch, smaller in evening
- feeling warm-ish in the evening (e.g. bath, heated blanket)

Managing sleep issues

Daily Routine

- Reduce stimulation in evening (e.g. loud noises, chores etc)
- Avoid napping, if possible, or limit to 1 nap of less than 30 minutes
- avoid heavy meals at bedtime (reduces awakenings caused by GERD)
- Limit liquids in the evening (reduces awakenings to toilet)
- Reduce or avoid alcohol, caffiene and nicotine

Managing sleep issues

Management of distress

- try to identify actvities that are soothing (e.g. calming music, photographs)
- keep home well lit in evening, may reduce confusion
- if restless, take a walk.
- make notes of what happens before sundowning to spot triggers

Managing sleep issues

Management of distress

- Talk to Dr about timing of medication (see list at end)
- Discuss worries and stressful events with enough time before bedtime
- aiming to reduce stress will help a person's readiness for sleep
- practice progressive muscle relaxation or other techniques to promote relaxation

Managing sleep issues

Sundowning

Management of distress

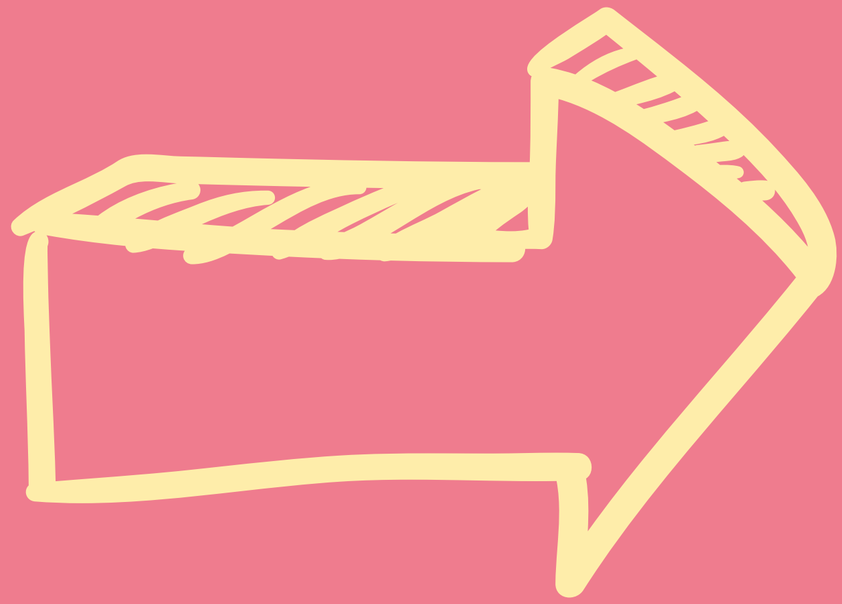
- Some studies suggests a white noise machine might help to promote better quality sleep + keep people asleep for longer
- Slow-stroke back massage during bedtime routine shown to promote sleep in nursing home residents living with dementia
- If disorientated or distressed about night/day- keeping simple day/night clocks in visual view may help.

Managing sleep issues

- If these do not help, please talk to GP as the GP can help to identify possible solutions. There could be a medical reason underlying these changes to sleep. E.g. medication timing, pain, infections, sleep apnea.

- be mindful that sedative drugs may increase the risk of falls.

What does sleep do for our health?



Brain function

Memory

Actively replay memories during sleep to move them from short term to long term storage in the brain

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Thinking processes

Risk of neurodegenerative conditions like dementia are doubled if you experience poor sleep regularly over your lifespan (Shi et al., 2018)

Waste clearance

Slow wave sleep facilitate metabolite clearance in the brain. Even one night of sleep deprivation can result in an increase of sticky proteins associated with Alzheimer's Disease (Shokri Kojori et al., (2018)

Memory

Sleep to remember

Nap as short at 6 mins boosts memory

sleep moves memories from short term to long term storage site

Waste Clearance

Sleeping helps to
clean the brain

Glymphatic system

Cerebrospinal fluid (CSF)

Removes metabolic waste

More active during sleep

Mental Health

Emotional Resillience

Participants sang karaoke over a backing track. The next morning, they took the backing track away leaving just their own singing. The half that were sleep deprived were very embarassed and the half that had slept dealt with the situation well. (Wassing et al., 2019)

Anxiety

Research show that insomnia is associated with a 24-fold increased risk of getting an anxiety disorder (Staner, 2022)

Depression

Insomnia and sleep disturbances are highly associated with depression and may even be a causal link. (Fang et al., 2019)

Physical Health

Immune function

Research shows that poor sleep is associated with a weakened immune respnse. A study found that after the flu vaccine, participants with insufficient sleep had a decreased antibody response compared to normal sleepers (Spiegel et al., 2002)

Restoration

During Slow Wave Sleep, large amounts of human growth hormone are released. This hormone helps maintain tissues and organs. Sleep loss interfers with this process.

Cardiovascular

<5 hours a night is associated with higher risk of high blood pressure.
<5 hours and 9+ is associated with coronary heart disease.
<5, and 9+ is associated with higher risk of diabetes. (Nagai et al., 2010)

Performance

Motivation

Sleep loss affects you capacity to take on effortful tasks and your performance. For example, research shows that when sleep deprived, people are more likely to eat fast-food than home cooked meals. (Elsmore et al., 1995)

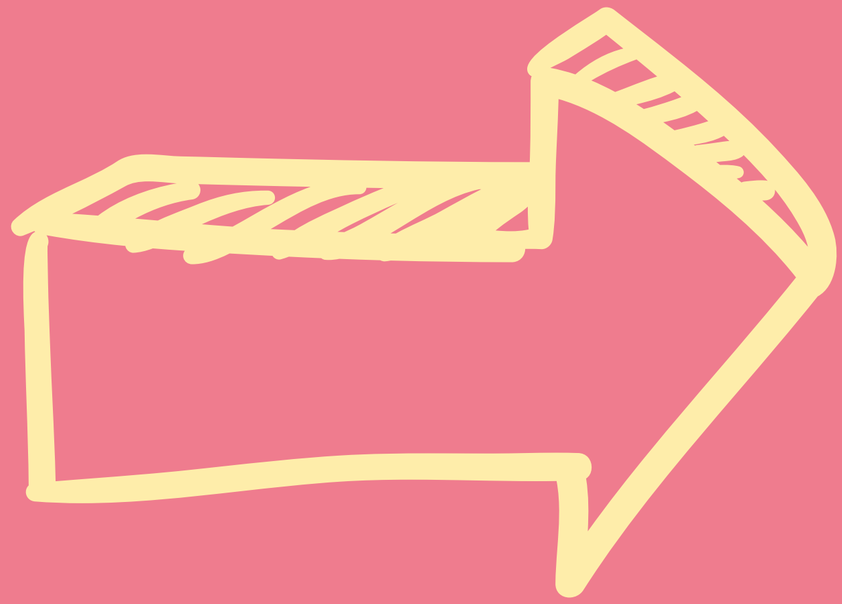
Driving

Studies show that sleep deprivation can have a greater impact performance than having a blood alcohol level of 22 µg/100mls of breath (just over legal limit).

Productivity

Research shows that sleep loss negatively impacts our thinking processes, makes us more sensitive to stress and illness and reduces our motivation to get hard tasks done. Poor sleep is associated with decreased work productivity (Yang et al., 2018)

What does healthy sleep look like?



Not just the amount of sleep

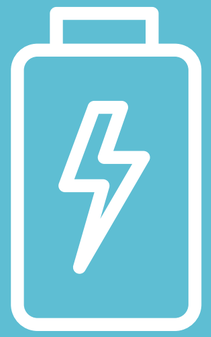
Sleep Duration + Sleep Quality

S.A.T.E.D.

Satisfaction

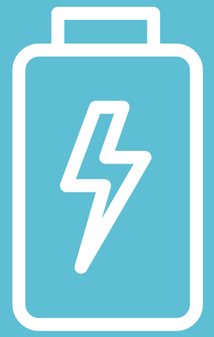
Are you satisfied with your sleep quality?

Alertness



Do you have enough energy in the day?

Timing



Do you keep a regular sleep schedule?

usual times, consistent even on weekends

Efficiency

Do you spend most of your time in bed sleeping?

>85%. (fall asleep within 30 minutes)

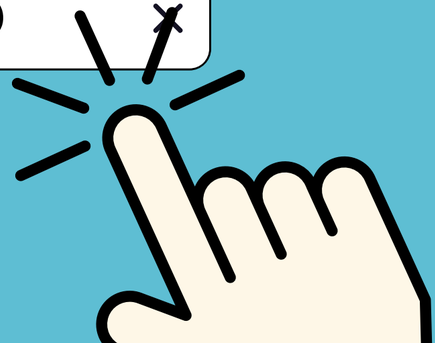
Duration

Are you getting enough sleep?

(7-9hrs)

morning evening questionnaire

Calculate by QxMD



Satisfaction

Alertness

Timing

Efficiency

Duration

Satisfaction

Alertness

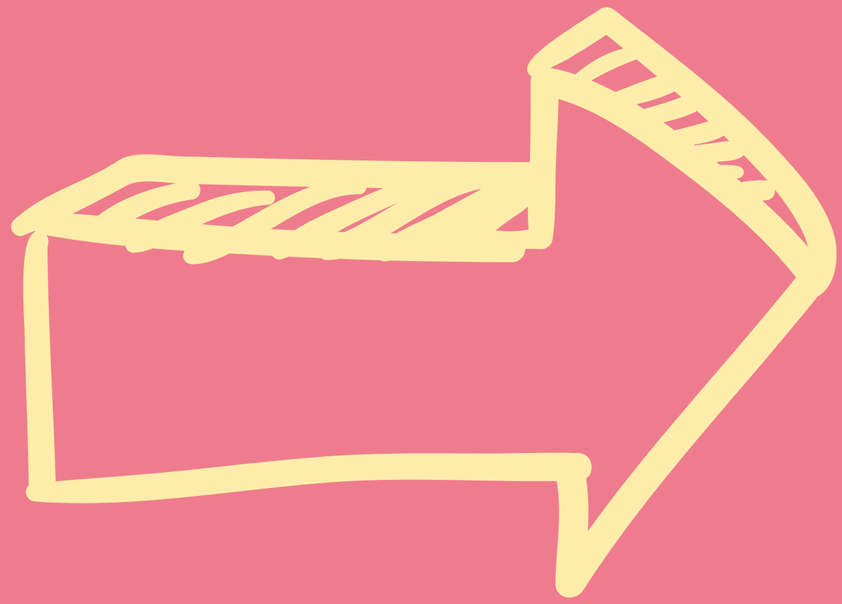
Timing

Efficiency

Duration

How would you rate your sleep health?

So what affects our sleep?



Sleep is not just about the night.

Sleep is not just about the night.

All aspects of our lives can affect sleep.

What factors do you believe can impact our sleep?

life events

Health

medication

...

Diet

Environment

light

worry

...

pain

sounds

age

Excitement

Stress

Relationships

...

Routine

Exercise

(UGH)

Stress

2 types of nervous systems

Parasympathetic

(rest and calm)

Sympathetic

(fight or flight)

The Arousal Continuum

Panic

Very Stressed

Stressed

Highly Alert

Alert & Calm

Alert

Drowsy

Deep Sleep

Coma

Sympathetic
Nervous System

Parasympathetic
Nervous System

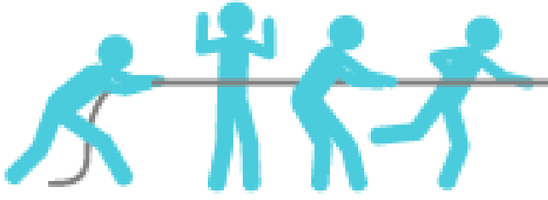
based on *The Science of Stress, Calm and Sleep with Andrew Huberman* https://youtu.be/Ft9N2-CEPzc

AUTONOMIC NERVOUS SYSTEM

SYSTEM IN BALANCE

REST-AND-DIGEST IS DOMINANT

FIGHT-OR-FLIGHT IS DOMINANT



REST-AND-DIGEST

FIGHT-OR-FLIGHT

Your Stress Response

Sympathetic

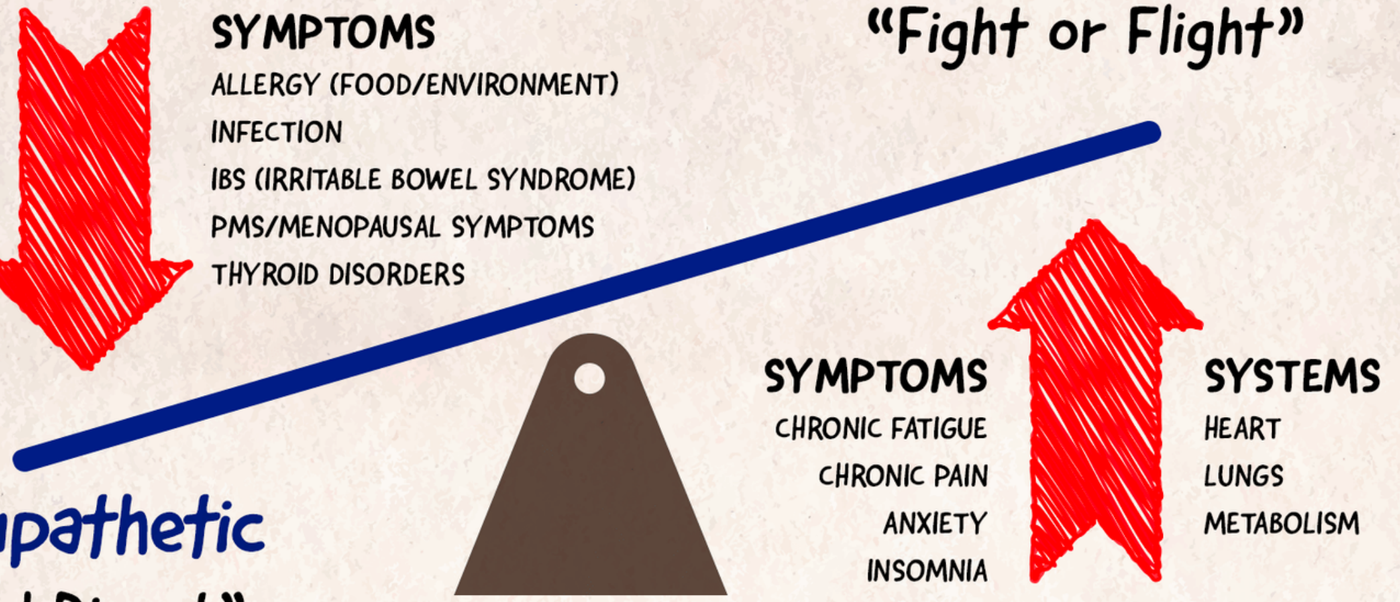
"Fight or Flight"

SYSTEMS

IMMUNE
DIGESTION
REPRODUCTION
THYROID

SYMPTOMS

ALLERGY (FOOD/ENVIRONMENT)
INFECTION
IBS (IRRITABLE BOWEL SYNDROME)
PMS/MENOPAUSAL SYMPTOMS
THYROID DISORDERS



SYMPTOMS

CHRONIC FATIGUE
CHRONIC PAIN
ANXIETY
INSOMNIA

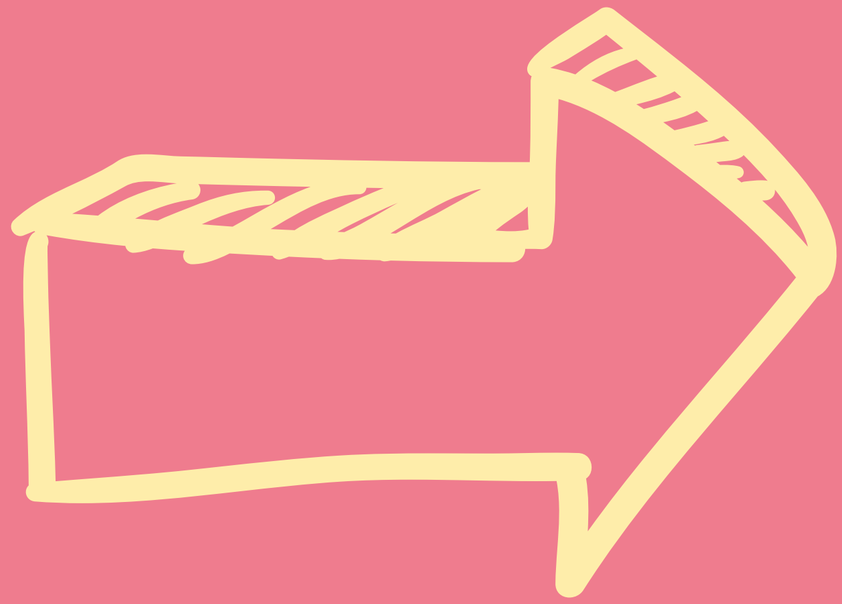
SYSTEMS

HEART
LUNGS
METABOLISM

Parasympathetic

"Rest and Digest"

So what protects our sleep?



being well

being well

wellbeing

P.E.R.M.A.

5 pillars

Seligman (2011)

Positive emotion

Flourish= joy, optimism, amusement, gratitude

helps to build resilience and overcome negative emotions (e.g. stres)

Engagement

being in the moment, experiencing 'flow'

Flow, or this concept of engagement, occurs when the perfect combination of challenge and skill/strength is found

(Csikszentmihalyi & LeFevre, 1989)

Relationships

sense of connectedness to others.

Meaning

finding meaning and purpose in our lives

Achievement

setting goals, working towards them and accomplishing them

Positive emotions

Engagement

Relationships

Meaning

Achievement

gratitude journalling

Positive self talk

Positive emotions

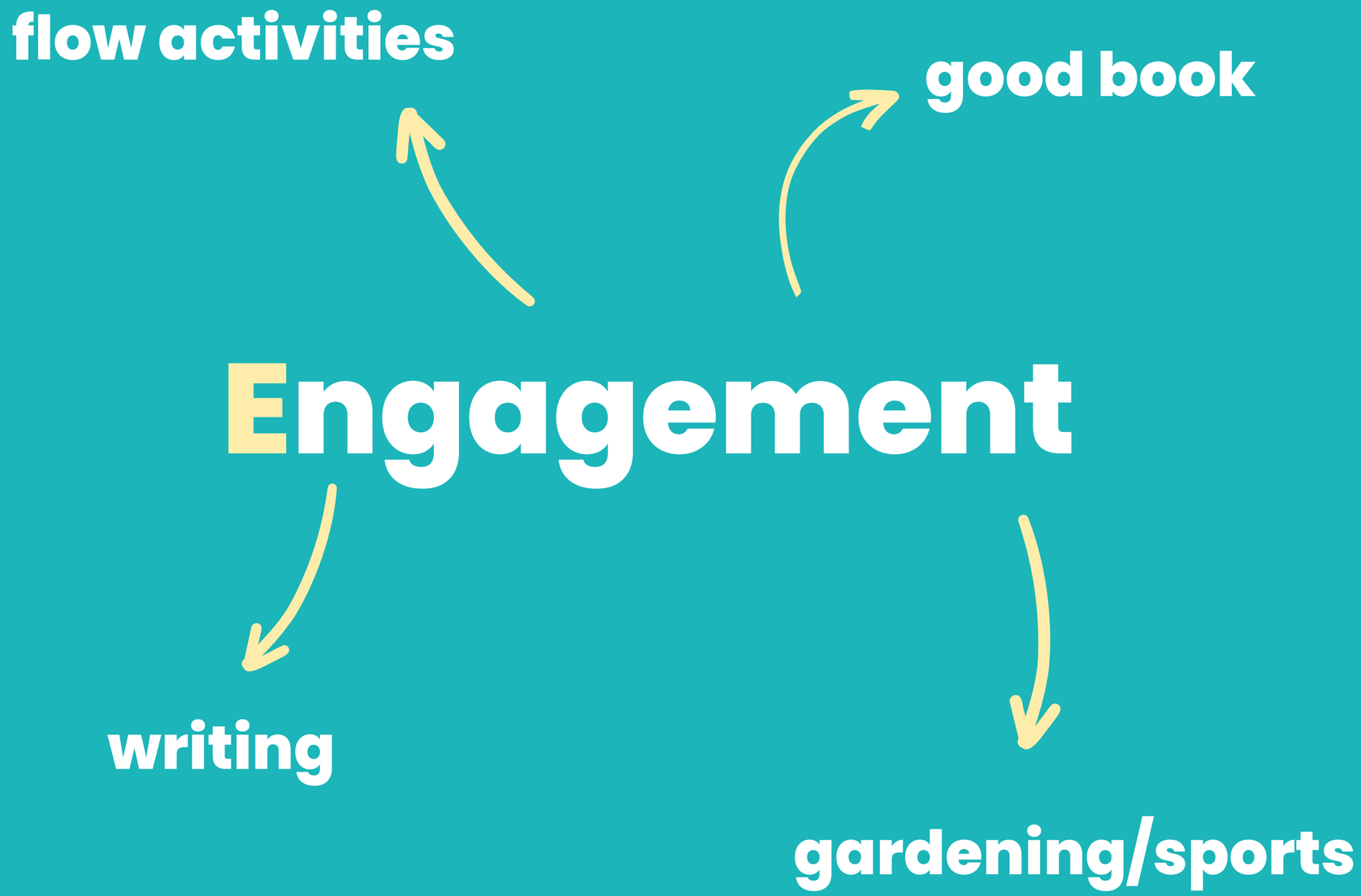
manage worries

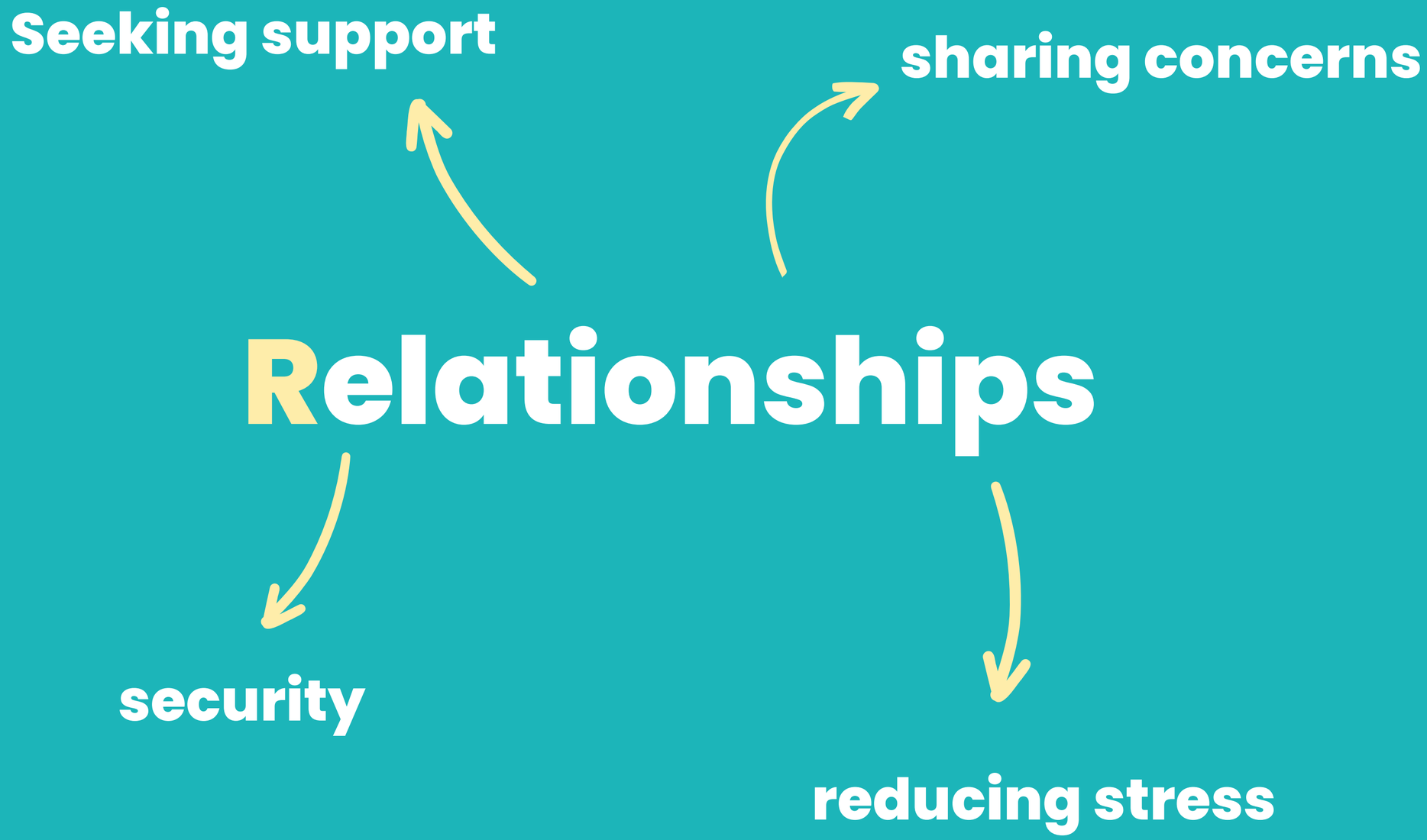
have a laugh

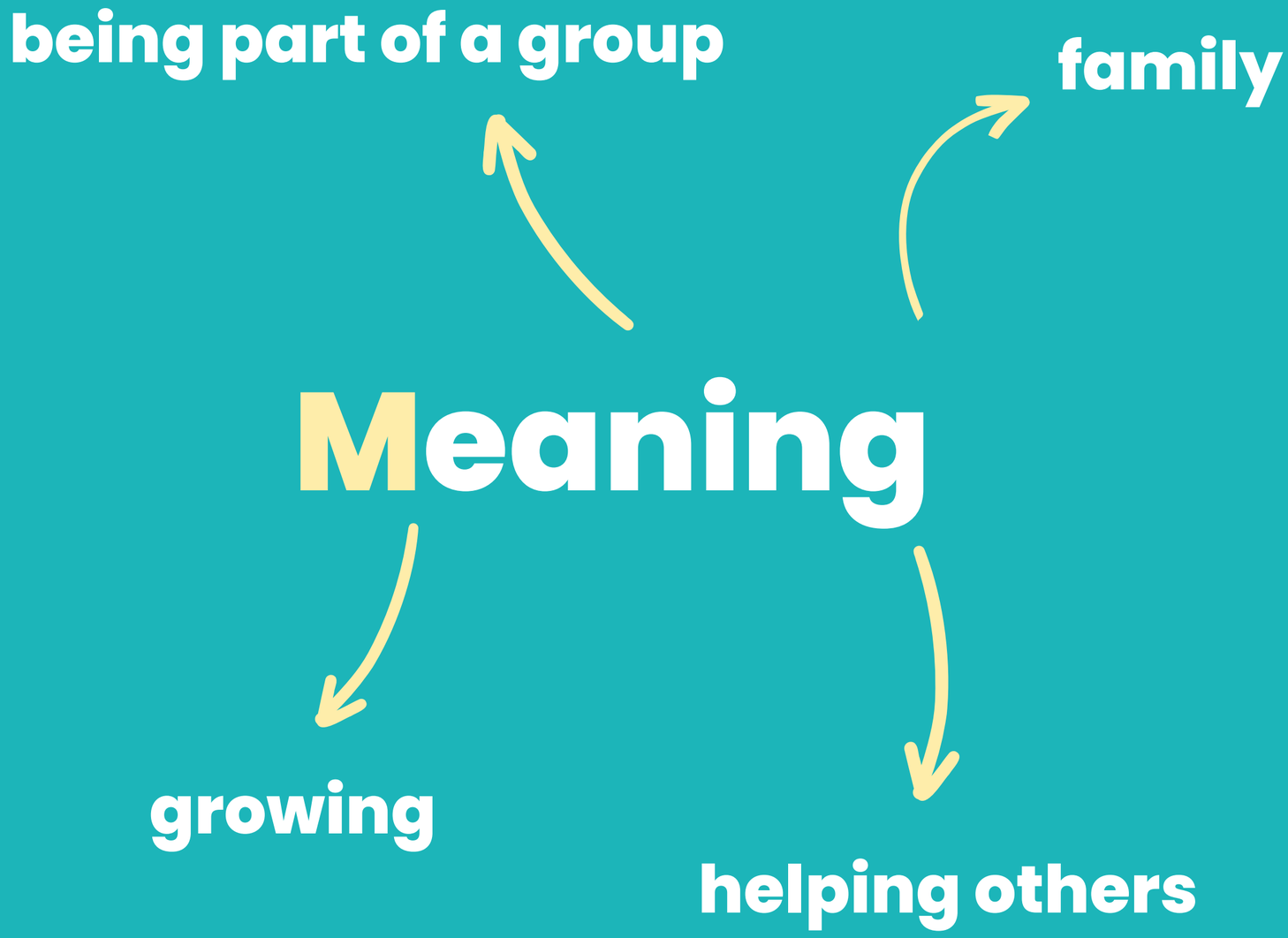
Anything worth doing is worth doing badly, until I get better at it

Give yourself praise. Talk to yourself like a friend.

Even if things aren't going perfectly, I'm doing my best right now.


flow activities
good book
Engagement
writing
gardening/sports


Seeking support
sharing concerns
Relationships
security
reducing stress

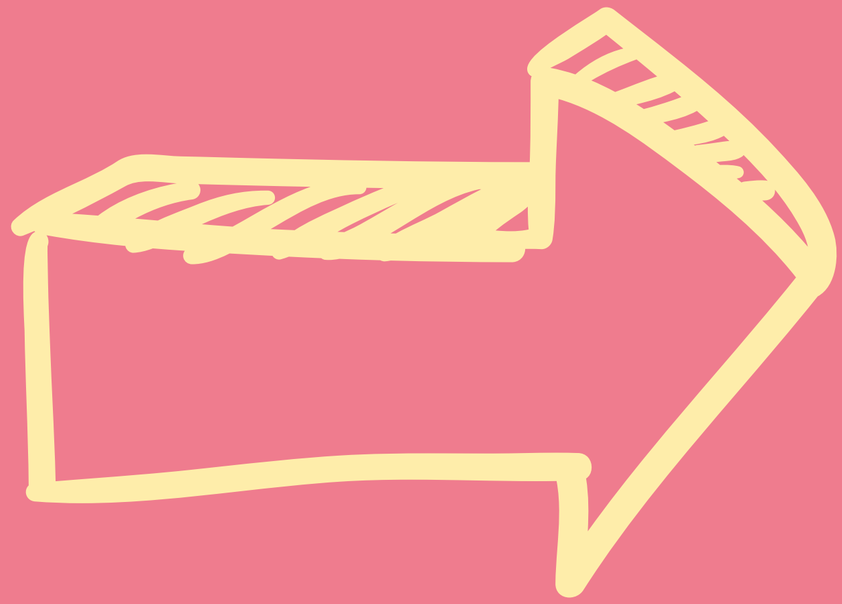


Kim et al., (2015)


Seeking support
sharing concerns
Achievement
security
reducing stress


PERMA model

What practical things can I do to get better sleep?



Sleep habits

~~sleep hygiene~~

Sleep hygiene has been shown to improve sleep but often only when part of multicomponent strategies.


sleep hygiene

Routine.

Wind down.

Sleep schedule.

Routine.

Wind down.

30-60 minutes 'you time'.

Enjoyable. Relaxing

Sleep schedule.

Routine.

Wind down.

30-60 minutes 'you time'.

Enjoyable. Relaxing

Sleep schedule.

Wake time = same

sleep time = same

Early sunlight

Dim evening

Stress Management

- CBT-i
- Constructive worry

Sleepio

Cognitive behavioural therapy for insomnia

Sleepio

Get out of bed after 20 mins.

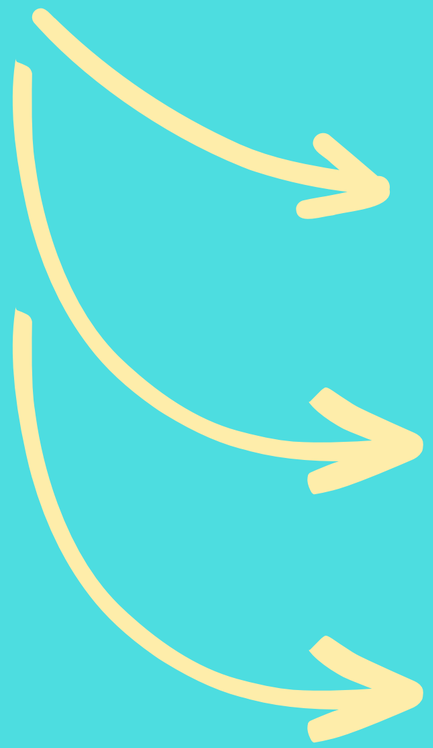
Return and ride the wave of sleepiness.

Worries	Next Steps

Challenging our thoughts

i can't get to sleep and I will not be able to function tomorrow.

Relaxation



mindfulness

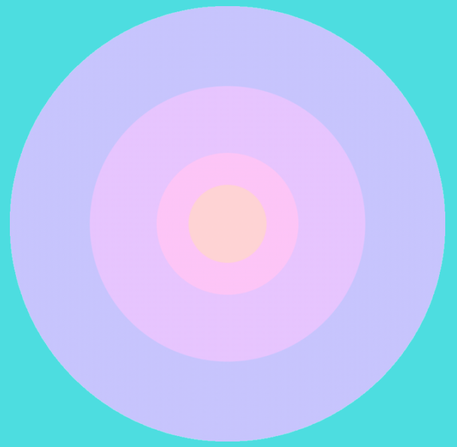
breathing

movement

Relaxation

Mindfulness

- Guided meditation
- focused awareness



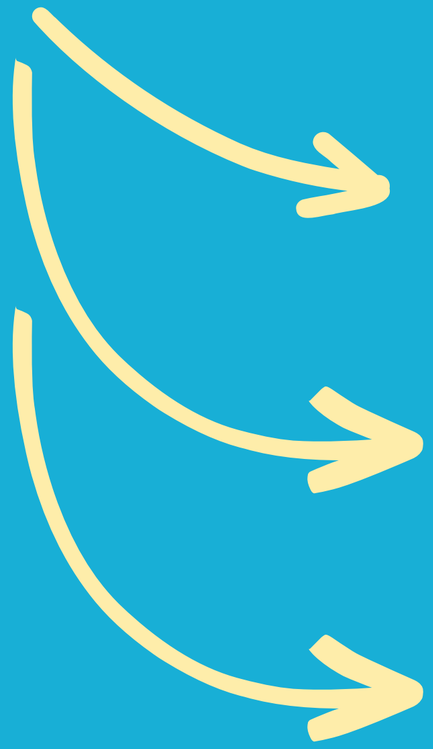
Breathing

- Box breathing
- Belly breathing

Gentle Movement

- Thai Chi
- Yoga Nidra

Environment



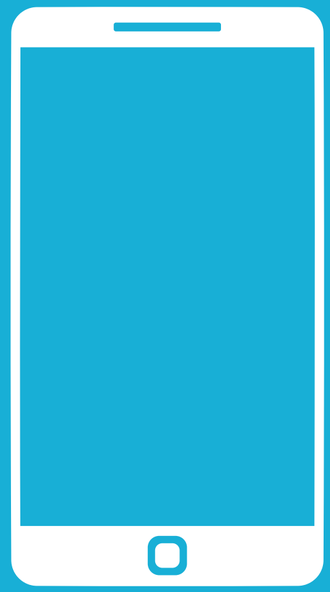
light

noise

temperatue

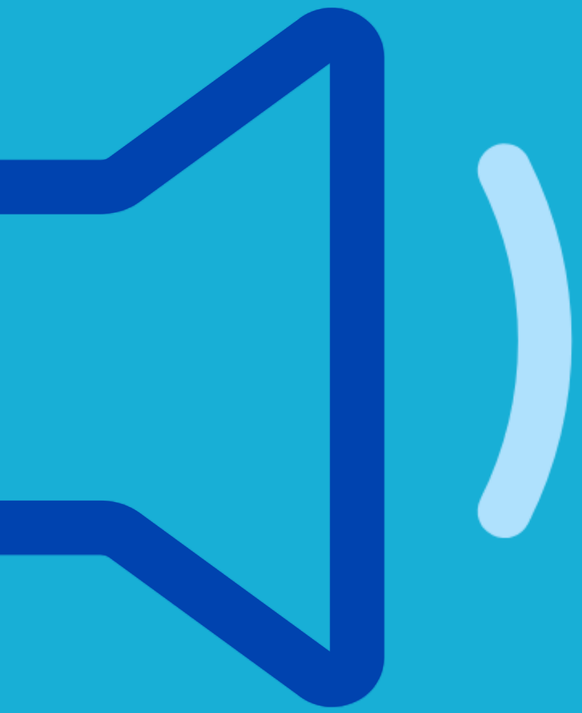
Light

Light



10 minutes
ASAP after waking

50x more
sensitive



noise

temperature

summary

Sleep is not just about the night.

Wellbeing= protective (PERMA)

Practical tools= sleep habits + underlying beliefs

routine, relaxation, stress management, environment,

When to seek help

It's important to rule out any underlying medical conditions.

There may be other things contributing to poor sleep. For example, if you snore loudly, you may have sleep apnea. This is just one example.

If the problem is persistent, despite your efforts to improve the situation, and if it is interfering with your ability to function on a daily basis, then speak to your GP for help.

If you want to get in touch
please contact me at:
799246@swansea.ac.uk

References

Staner, L. (2022). Sleep and anxiety disorders. Dialogues in clinical neuroscience.

Wassing, R., Benjamins, J. S., Talamini, L. M., Schalkwijk, F., & Van Someren, E. J. (2019). Overnight worsening of emotional distress indicates maladaptive sleep in insomnia. Sleep, 42(4), zsy268.

Fang, H., Tu, S., Sheng, J., & Shao, A. (2019). Depression in sleep disturbance: a review on a bidirectional relationship, mechanisms and treatment. Journal of cellular and molecular medicine, 23(4), 2324-2332.

Elsmore, T. F., Hegge, F. W., Naitoh, P., Kelly, T., & Schlangen, K. (1995). A Comparison of the Effects of Sleep Deprivation on Synthetic Work Performance and a Conventional Performance Assessment Battery. NAVAL HEALTH RESEARCH CENTER SAN DIEGO CA.

Yang, R., Hale, L., Branas, C., Perlis, M., Gallagher, R., Killgore, W., ... & Grandner, M. (2018). 0189 Work productivity loss associated with sleep duration, insomnia severity, sleepiness, and snoring. Sleep, 41(suppl_1), A74-A74.

Nagai, M., Hoshide, S., & Kario, K. (2010). Sleep duration as a risk factor for cardiovascular disease-a review of the recent literature. Current cardiology reviews, 6(1), 54-61.