Eklipta

SLEEP ISSUES

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STAFF MENTOR - ABEKA ESSEL

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ISSUES

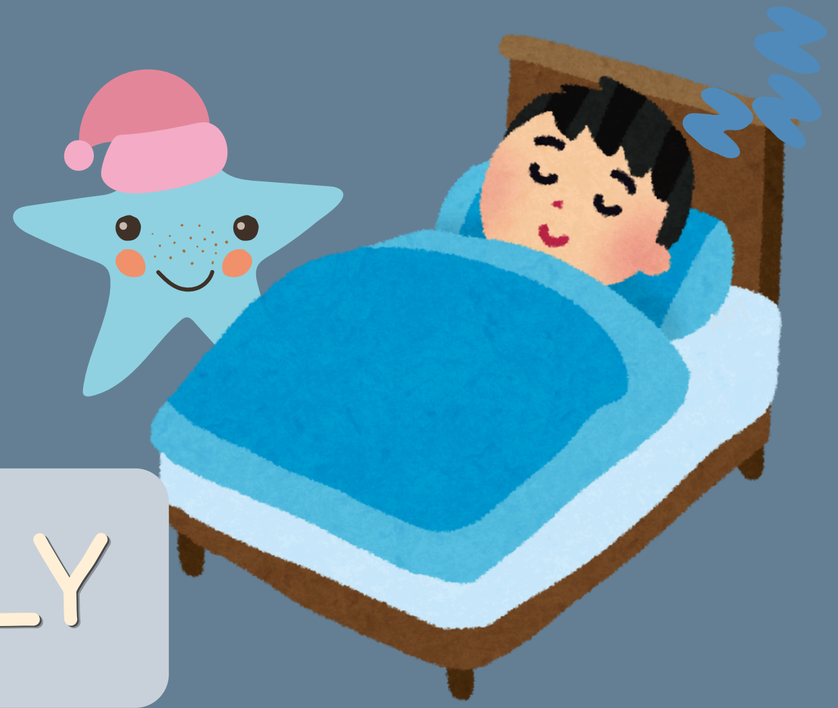


19% – 69% of adolescents get less than 8 hours on a school day, depending on the country (lowest: South Africa · highest: South Korea).

CAN'T

WON'T

TOO EARLY



WITH SLEEP DEPRIVATION

You will suffer from

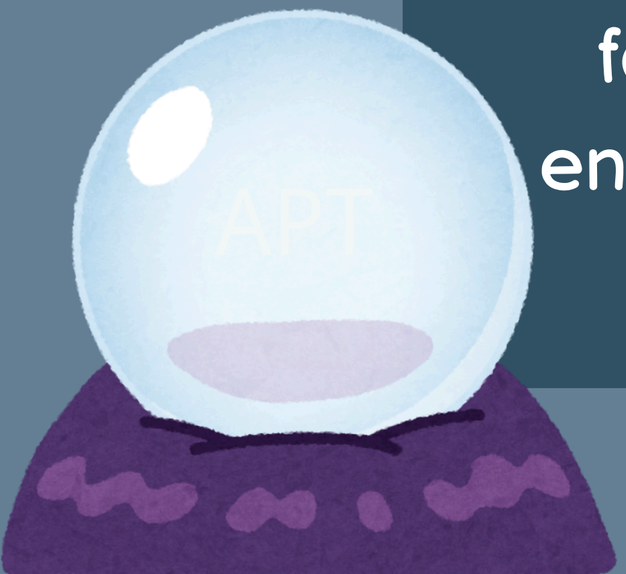
- fatigue
- headaches
- poor coordination
- poor concentration, reaction
- impaired memory
- mood swings
- anxiety
- ...





OUR NEEDS STATEMENT:

Young people between the ages of 14-25 who struggle with falling asleep need a way to adjust their sleep schedule in a way that is more suitable for their developmental well being while enhancing their quality and length of sleep.





CURRENT SOLUTIONS



Melatonin



CBT-I



Trackers & apps

PROTOTYPE

...ing. Designed for Your Best Sleep.

...p is an intelligent pillow that tracks your b...ivity with EEG, learns your unique sleep patterns, and uses multi-sensory, closed-loop stimulation to help you fall asleep faster, stay deeper, and wake up at the perfect time.

TRACK
Monitors brain activity in real-time with integrated EEG sensors.

LEARN
AI analyzes your sleep and learns what helps you sleep best.

OPTIMIZE
Automatically delivers personalized stimulation to improve your sleep.

High-sensitivity dry EEG sensors monitor brainwaves through advanced signal processing.

Cool you down or warm you up with intelligent climate control for the perfect sleep environment.



Built-in Speakers
High-quality speakers deliver soothing music, white noise, or alarms.

Aromatherapy (Smell)
Built-in scent diffuser releases clinically proven sleep-enhancing scents to calm your mind and body.

Multi-Sensory Stimulation System
Closed-loop AI automatically delivers the right stimulation at the right time based on your brain activity and sleep stage.

Vibration
Gentle vibrations help relax your body and can be timed with breathing or sleep stage transitions.



MULTI-SENSORY, CLOSED-LOOP STIMULATION (AI CONTROLLED)

Real-time brain feedback → AI decides → Pillow responds → Better sleep

CLOSED-LOOP AUDITORY STIMULATION (CLAS)
AI detects your brainwaves and plays personalized sounds at the precise time to guide your brain into deeper sleep.
How it helps: Enhances slow waves and stabilizes sleep cycles.

SOUND
Built-in speakers play soothing music, white noise, or nature sounds —or act as an alarm.
How it helps: Masks disturbances, helps you fall asleep faster, or wakes you gently.

SMELL
Aromatherapy diffuser releases calming scents (lavender, chamomile, sandalwood, etc.).
How it helps: Reduces stress and anxiety, promotes relaxation.

BREATH
Guided breathing exercises with haptic and audio cues match your natural rhythm.
How it helps: Slows heart rate, lowers cortisol, and prepares your body for sleep.

VIBRATION
Gentle vibrations help relax your body and can be timed with breathing or sleep transitions.
How it helps: Relieves tension and promotes deeper relaxation.

ADJUSTABLE TEMPERATURE & PRESSURE
Individual climate control and air-cell firmness adjust to your preference automatically throughout the night.
How it helps: Maintains ideal comfort for uninterrupted sleep.

TRACKING BRAIN ACTIVITY BY EEG

We monitor key brainwaves in real-time:

- Delta (0.5 – 4 Hz) Deep, restorative sleep
- Theta (4 – 7 Hz) Light sleep, drowsiness
- Alpha (8 – 12 Hz) Relaxed, calm wakefulness
- Beta (13 – 30 Hz) Alert, active thinking



The AI continuously analyzes your brain activity

SENDS SPECIFIC BRAINWAVES TO ASSIST WITH SLEEP

Through Closed-Loop Auditory Stimulation, NeuroSleep plays sounds embedded with therapeutic frequencies (isocronic tones) that help nudge your brain into deeper, more stable sleep.



Example:
Low-frequency sounds during light sleep increase slow-wave activity (Delta)

WAKE YOU UP AT THE RIGHT TIME (NREM 1 – THE BEST TIME TO WAKE)

The AI predicts your sleep cycles and wakes you gently during NREM 1 – the lightest stage of sleep – so you feel refreshed, not groggy.

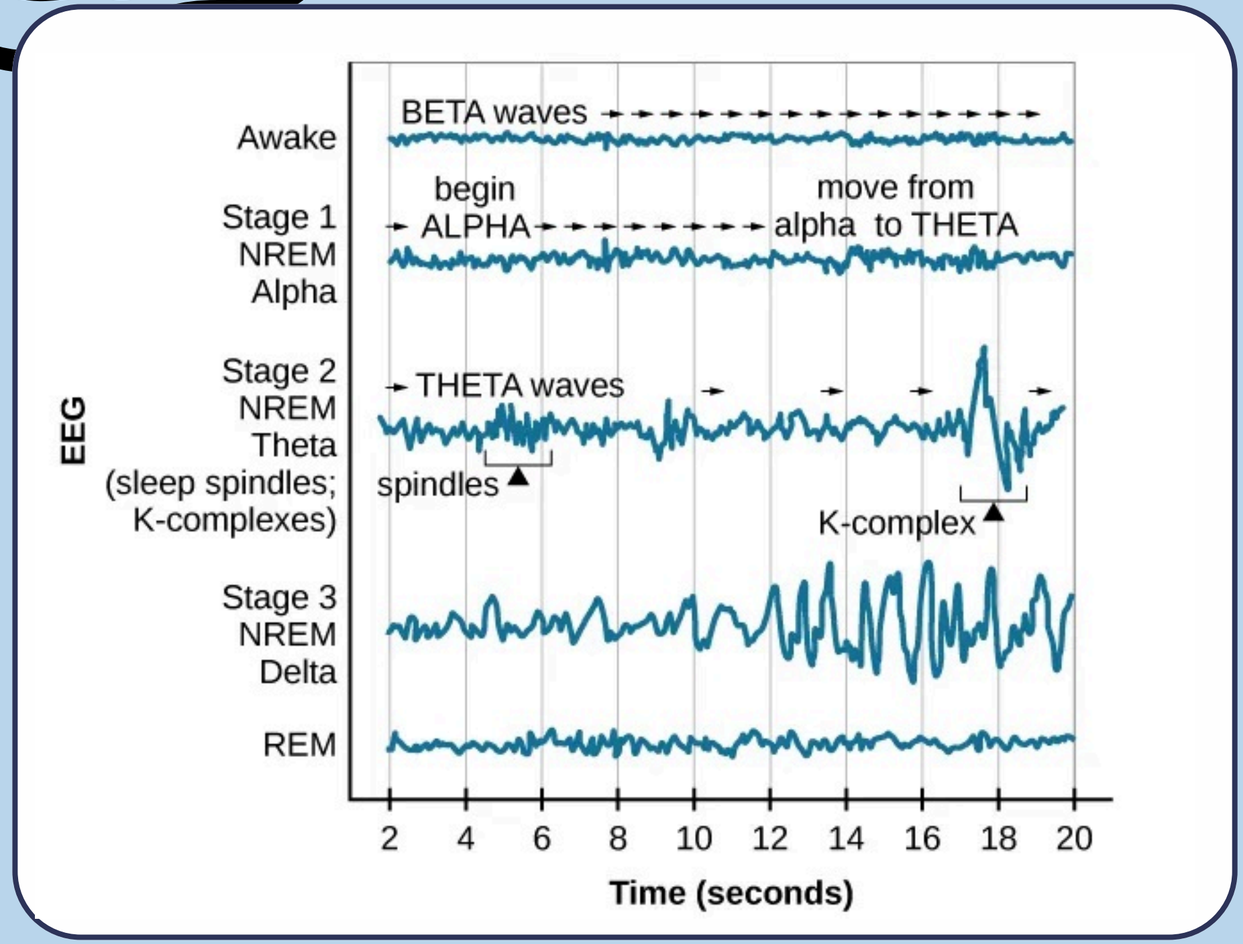
Deep Sleep	Light Sleep	REM Dream	Light Sleep	NREM 1 Best time to wake



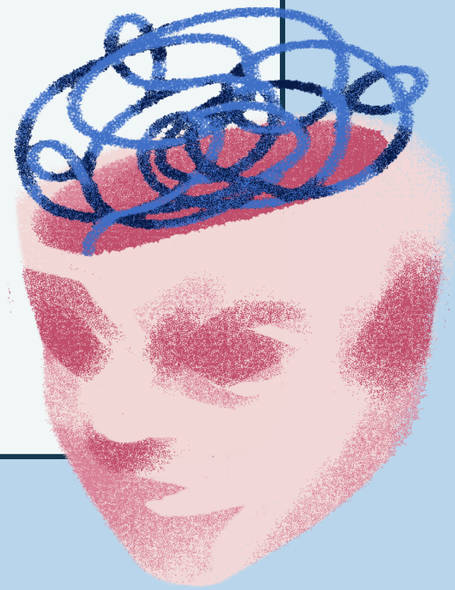
Smart Alarm

EKLIPTA

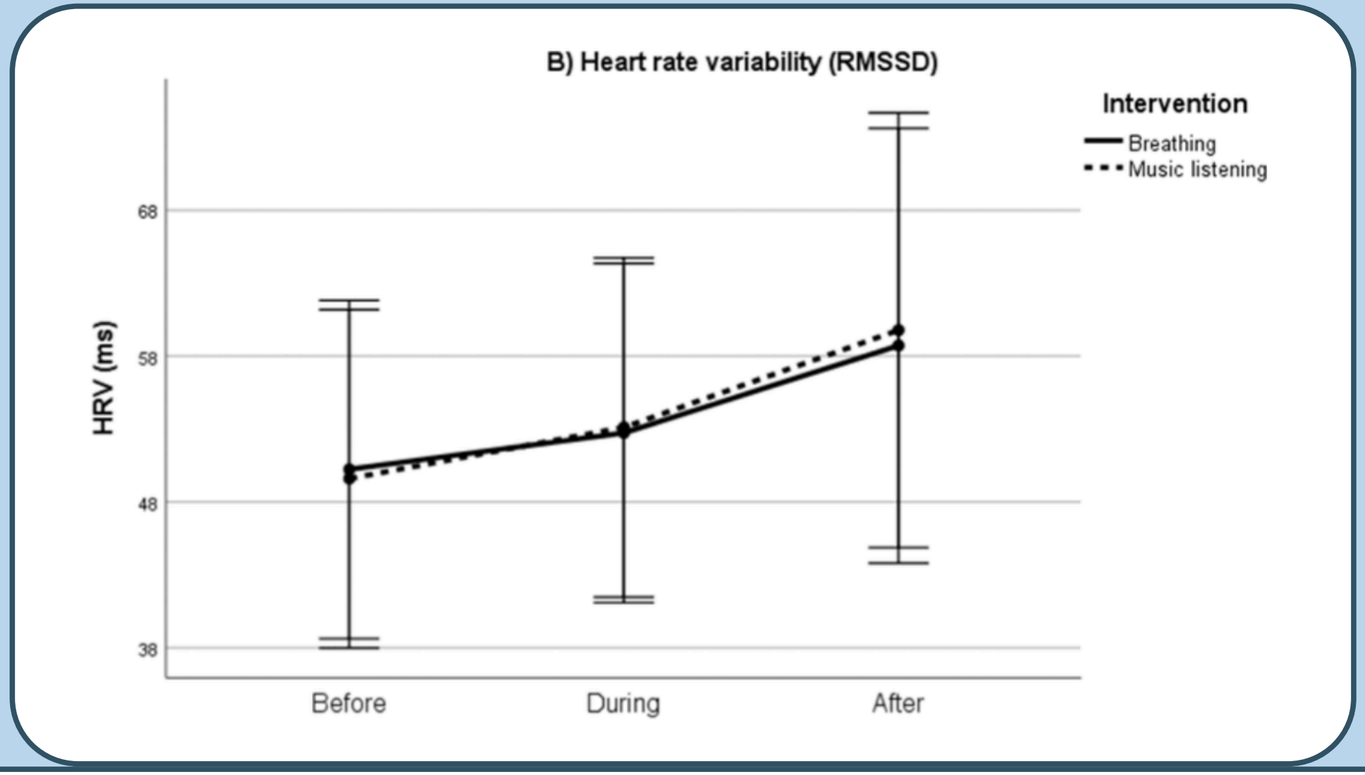
TRACK BRAIN ACTIVITY THROUGH EEG



1. BRAIN WAVE
2. SLEEPING STAGE
3. AI ANALYSIS
4. ACTION BY PILLOW
5. SLEEP IMPROVED



BREATH GUIDIANCE



The Effects of Presleep Slow Breathing and Music Listening on Polysomnographic Sleep Measures – a pilot trial: https://www.nature.com/articles/s41598-020-64218-7

VIBROTACTILE STIMULATION

TABLE 2 Polysomnographic results in each experimental condition for the entire night (Mean ± SD).

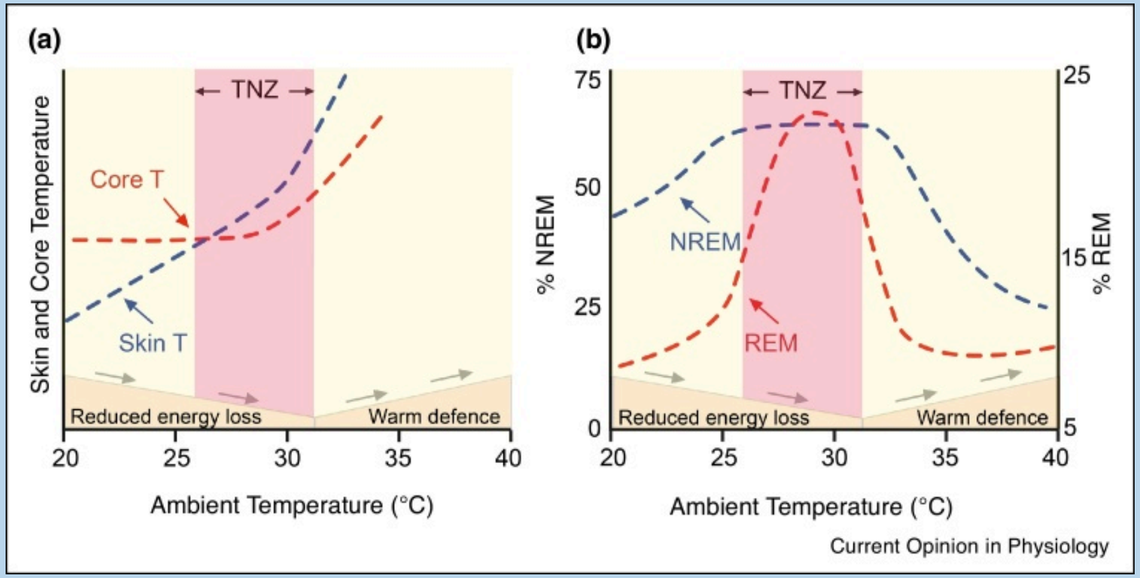
Parameters		SHAM	STIM	*p*-value
TRT (min)		421.2 ± 3.1	417.7 ± 12.8	0.333
TST (min)		365.8 ± 33.9	371.6 ± 30.1	0.368
SPT (min)		414.4 ± 5.8	408.7 ± 14.2	0.147
SE (%)		86.9 ± 8.1	89.0 ± 6.8	0.398
SOL (min)		6.8 ± 5.5	9.1 ± 9.5	0.286
DEEPL (min)		57.9 ± 82.5	53.4 ± 37.7	0.749
REML (min)		131.9 ± 87.2	113.1 ± 48.3	0.463
AHI (event/h)		8.2 ± 6.6	9.4 ± 7.7	0.184
PLMI (event/h)		0.3 ± 1.1	0.6 ± 1.9	0.188
WASO	Total time (min)	48.6 ± 30.3	37.0 ± 27.3*	0.044
	Proportion (%SPT)	11.8 ± 7.6	9.1 ± 6.6*	0.050
	Average duration (min)	3.2 ± 1.9	2.6 ± 1.5*	0.031
Stage N1	Total time (min)	52.7 ± 25.3	51.0 ± 30.8	0.376
	Proportion (%TST)	14.6 ± 7.1	13.9 ± 8.4	0.355
	Proportion (%SPT)	12.7 ± 6.0	12.5 ± 7.6	0.494
	Average duration (min)	2.0 ± 0.5	2.0 ± 1.0	0.198
Stage N2	Total time (min)	227.4 ± 32.2	233.4 ± 31.2	0.313
	Proportion (%TST)	62.1 ± 6.2	62.8 ± 6.9	0.646
	Proportion (%SPT)	54.6 ± 7.5	57.1 ± 7.5	0.113
	Average duration (min)	9.1 ± 4.3	8.9 ± 3.3	0.748
Stage N3	Total time (min)	52.7 ± 25.3	51.0 ± 30.8	0.376
	Proportion (%TST)	14.6 ± 7.1	13.9 ± 8.4	0.355
	Proportion (%SPT)	4.9 ± 5.4	4.5 ± 5.0	0.508
	Average duration (min)	3.0 ± 3.1	3.3 ± 3.7	0.605
REM	Total time (min)	65.4 ± 22.7	68.9 ± 25.1	0.619
	Proportion (%TST)	17.9 ± 5.9	18.4 ± 5.9	0.772
	Proportion (%SPT)	15.8 ± 5.5	16.8 ± 5.9	0.540
	Average duration (min)	23.0 ± 19.1	20.5 ± 9.3	0.872

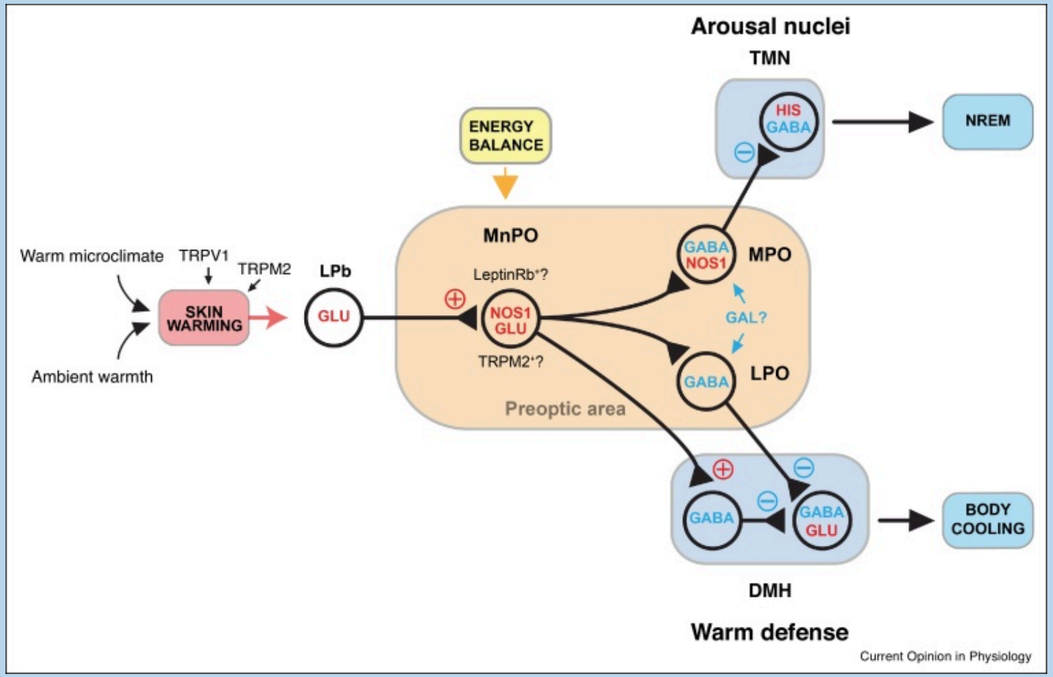
TRT, total recording time; TST, total sleep time; SPT, sleep period time; SE, sleep efficiency; SOL, sleep onset latency; DEEPL, deep sleep latency; REML, rapid eye movement sleep latency; AHI, apnea hypopnea index; PLMI, periodic limb movement index; WASO, wake after sleep onset; REM, rapid eye movement sleep; SHAM, condition without stimulation; and STIM, condition with stimulation. *$p < 0.05$.

Stage N1	Total time (min)	52.7 ± 25.3	51.0 ± 30.8	0.376
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Effect of closed-loop vibration stimulation on sleep quality for poor sleepers:
https://www.frontiersin.org/journals/neuroscience/articles/10.3389/fnins.2024.1456237/full

ADAPTIVE TEMPERATURE + PRESSURE/STIFFNESS





Sleep and thermoregulation:https://pmc.ncbi.nlm.nih.gov/articles/PMC7323637/?utm_source=chatgpt.com

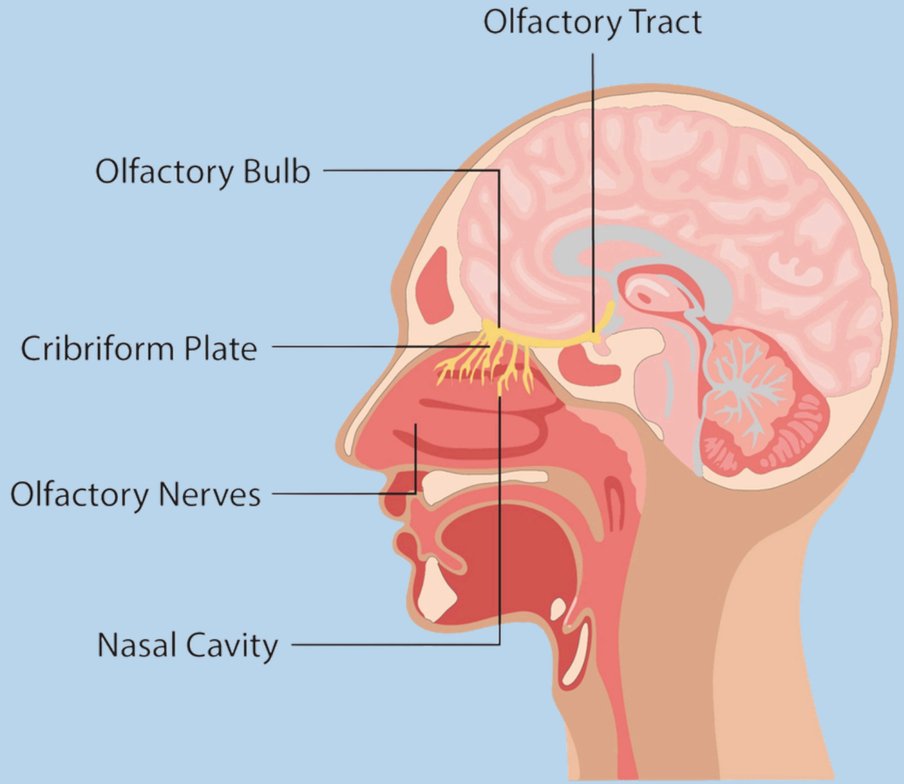
SMELL

SCENT REACHES THE BRAIN'S EMOTION AND MEMORY CENTRES DIRECTLY, WITHOUT WAKING YOU

LOWERS PRE-SLEEP AROUSAL

HOW WE USE IT

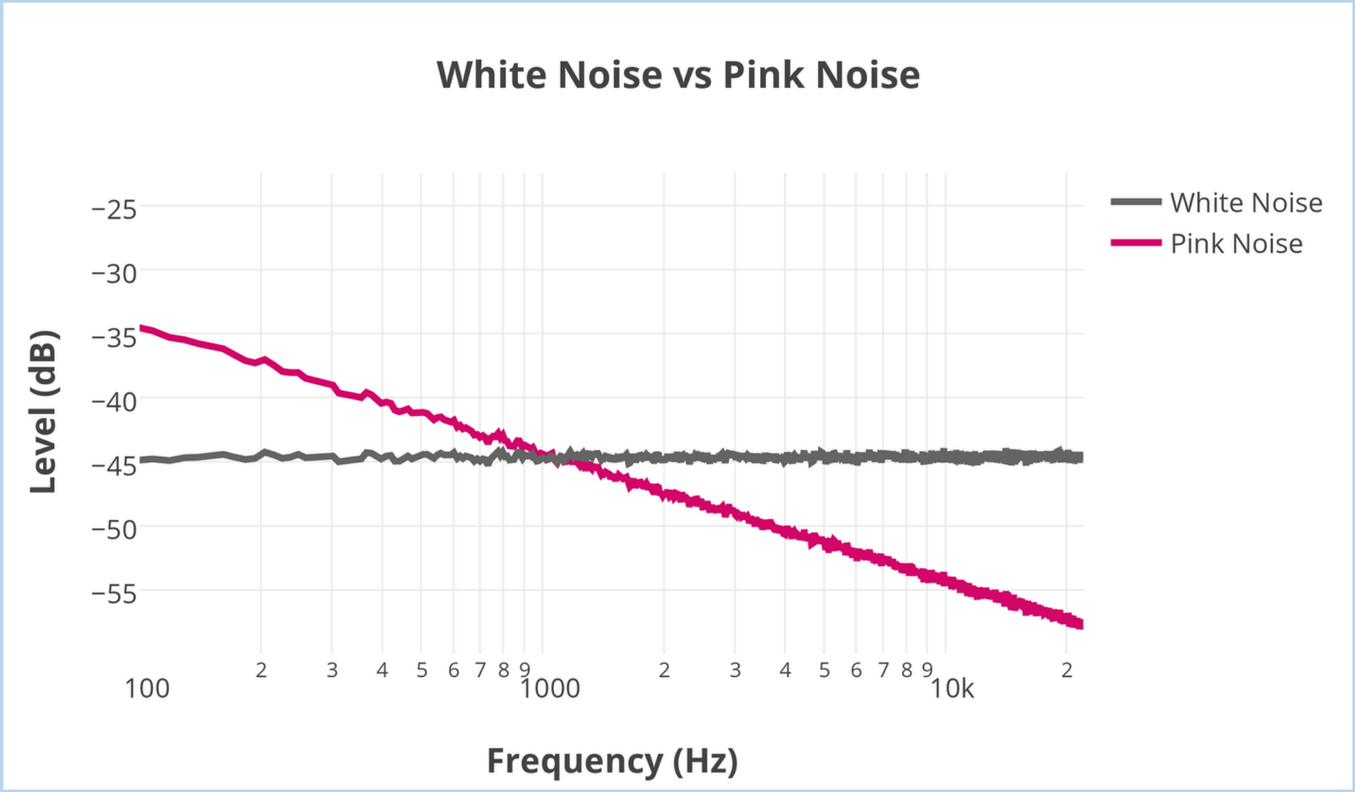
The pillow releases a user-chosen scent at two moments: during sleep onset, and during stage 3 NREM sleep.



SOUND

AUDIO SELECTED BY USERS

PINK NOISE



Zhou J, Liu D, Li X, Ma J, Zhang J, Fang J. Pink noise: effect on complexity synchronization of brain activity and sleep consolidation. J Theor Biol. 2012 Aug 7;306:68-72. doi: 10.1016/j.jtbi.2012.04.006. Epub 2012 Apr 25. PMID: 22726808.

WAKE UP!!!

“Abrupt awakening during a slow wave sleep (SWS) episode produces more sleep inertia than awakening in stage 1 or 2, REM sleep being intermediate.”

--- Sleep inertia(https://pubmed.ncbi.nlm.nih.gov/12531174/)

ETHICAL/FINANCIAL CONSIDERATIONS

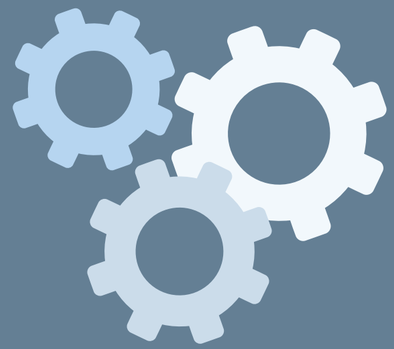




Privacy of EEG /sleep data

User dependence

ETHICAL/FINANCIAL CONSIDERATIONS

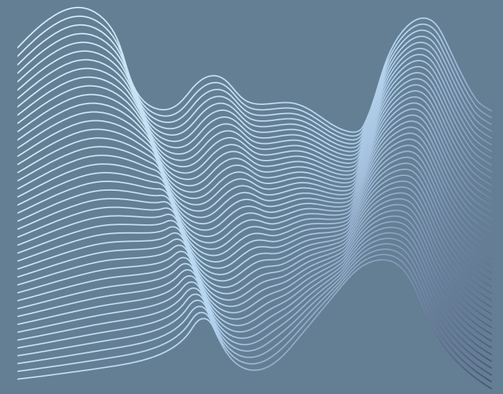




Technological developments

Production& maintenance cost

LIMITATIONS





EEG Accuracy

Contact with pillow

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8. Henao, J. M., et al. (2020). Examining the optimal timing for closed-loop auditory stimulation of slow-wave sleep in young and older adults.
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Sleep Issues

THANK YOU

for listening to our presentation