Phase-Targeted Auditory Stimulation to Reduce Sleep Slow-Wave Activity in Depressed Patients at Home: A Feasibility Study

Conference Poster

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Auditory down-phase stimulation to reduce SWA

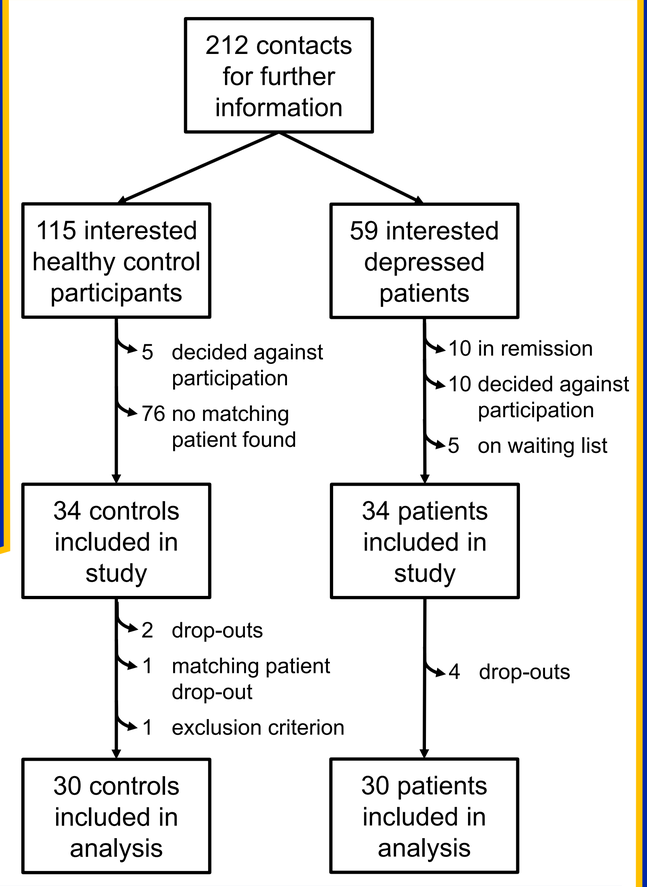
Slow-wave activity (SWA, 0.5-4 Hz) during non-REM sleep is an established marker of the homeostatic facet of sleep regulation [1]. Phase-locked auditory stimulation, where brief tones are presented precisely targeted to a specific phase of slow waves, was shown to enhance or reduce SWA depending on the targeted phase [2]. **Down-phase stimulation was associated with a sleep deprivation-like effect** on learning efficiency [3]. Since sleep deprivation has **long been known to exert rapid antidepressant effects** [4], there could be **a potential therapeutic application of down-phase stimulation,** especially if it can be performed at home.

Therefore, we investigated whether it is feasible for depressed patients to perform phase-targeted auditory down-phase stimulation at home using a wearable device [5].

Tosoo® sleep band TSB Axo A1.1/2.1

Sleep monitoring and stimulation device for home use

Recruitment



Timeframe first patient first visit - last patient last visit: 16 months

840 potential night recordings

823 available **98%**

device not worn (*n*=10)
user error (*n*=3)
device error (*n*=4)

774 with successful stimulation **94%**

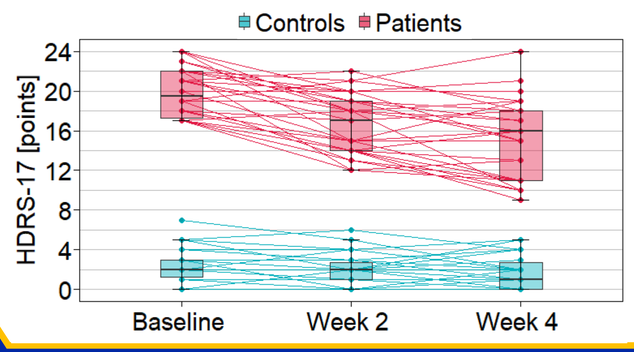
insufficient data quality (*n*=31)
parameter adjustments after first night (*n*=7)
recording duration below 2 hours (*n*=11)

Participant characteristics

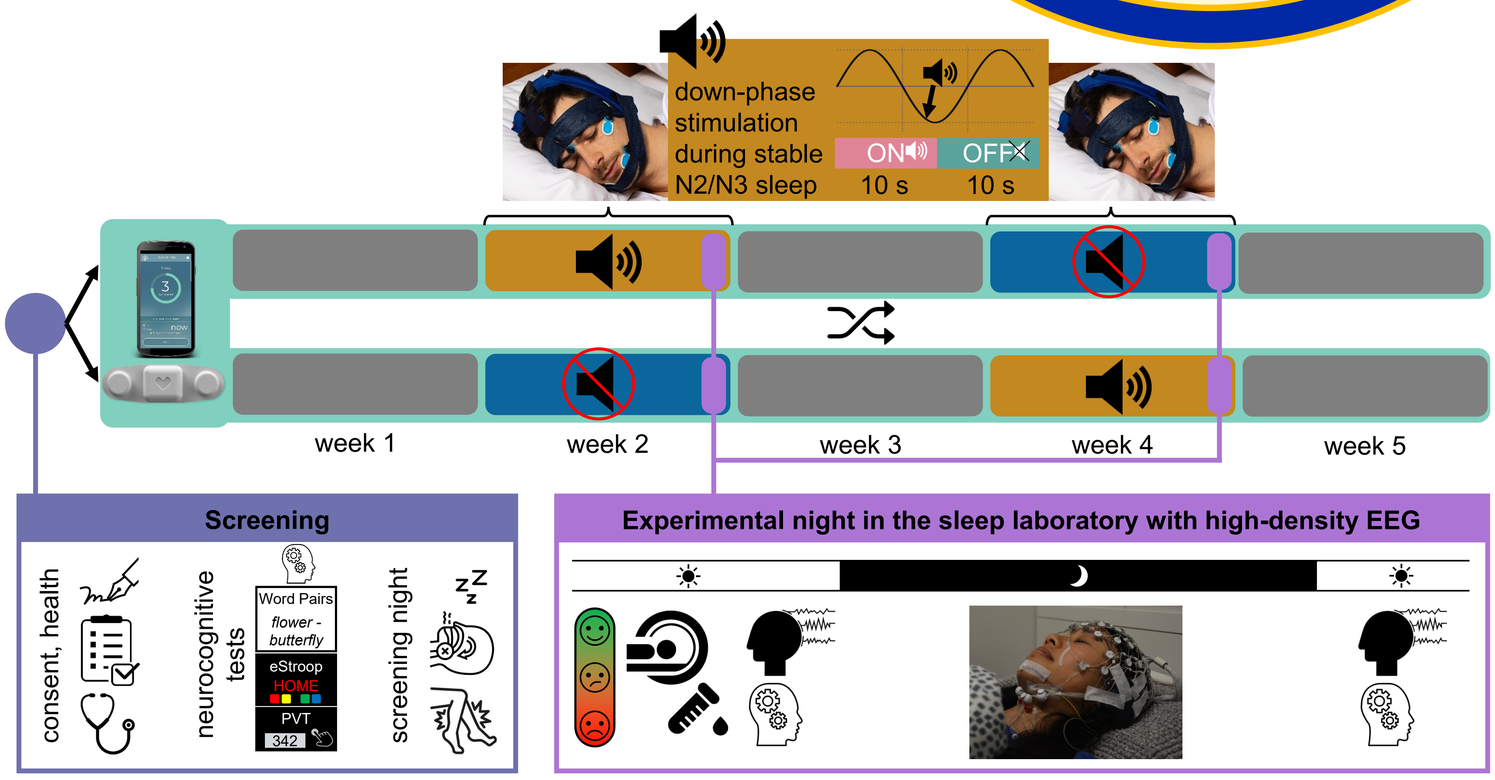
	Healthy controls	Depressed patients
Age [y]	30.0±7.8	29.9±8.1
Sex [% female]	63.3 %	63.3 %
Baseline BDI	2.6±3.0	31.6±8.6
Baseline HDRS	2.4±1.6	20.2±2.5
Baseline PSQI	3.7±1.9	8.8±3.5
Baseline ESS	4.8±2.5	7.1±4.1

*results described as mean ± standard deviation or proportion

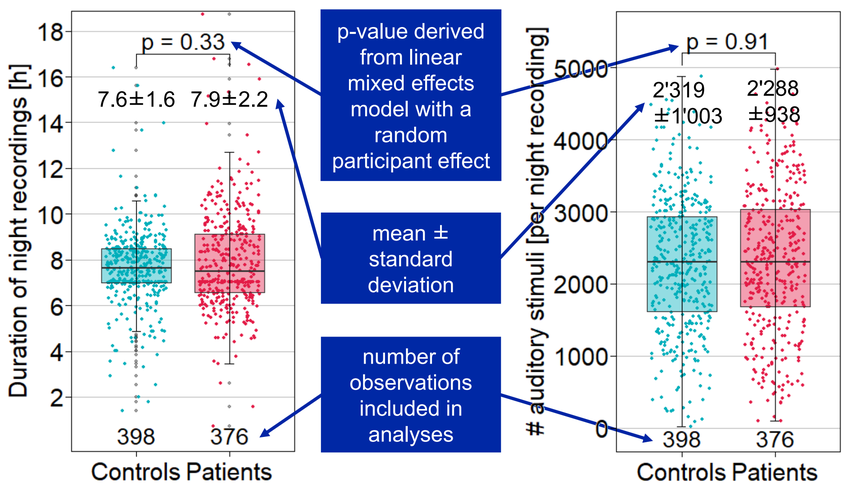
Observer-rated depression symptoms



Double-blind cross-over study design



Recordings and stimulations



Conclusion

- **reliable recording** and **auditory stimulation** using the Tosoo® sleep band
  - in the **home** and **sleep laboratory** settings
  - in **depressed** patients and **healthy** control participants
  - **good data quality** reflected by a high **number of auditory stimuli**
- **vivid interest** in both groups
  - **patient recruitment** completed within one year, whole study within 16 months
  - **non-pharmacological approach** repeatedly mentioned as reason for participation
- **rich dataset for further analyses**

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