Neurobehavioral Outcomes Immediately Following a Daytime Sleep Opportunity With Pink Noise

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Introduction

- Pink noise is purported to enhance slow wave activity during sleep
- Increased slow wave activity during a sleep episode has been associated with greater sleep inertia symptoms after waking
- We investigated whether a pink noise intervention during a 4-hour daytime nap affected neurobehavioral outcomes immediately after the sleep opportunity

Methods

- *N* = 14 healthy adults (7 male; 24.9 years ± 5.2)
- Two 26-hour periods in the sleep laboratory, both preceded by a week at home of 8.5 hours' time-in-bed (actigraphy verified)
- Both lab visits included a 4-hour nap opportunity ending 10 hours after habitual waketime (i.e., during the circadian day)
- Randomized, cross-over design (Fig. 1, top right):
  - **Intervention (pink noise)**: Nap with pink noise (50 dB) played through headband speakers
  - **Control (no sound)**: Nap with headband with no sound playing.
- Test battery: Karolinska Sleepiness Scale (KSS) and 5-minute psychomotor vigilance task (PVT; NASA PVT+ App; speed: 1000/reaction time [ms]) at pre-nap (baseline, BL), and 2 (T1), 12 (T2), 22 (T3), and 32 (T4) min post-nap
- Mixed-effects models explored the difference between the two conditions and across test bouts. Sex and baseline measures were included as covariates

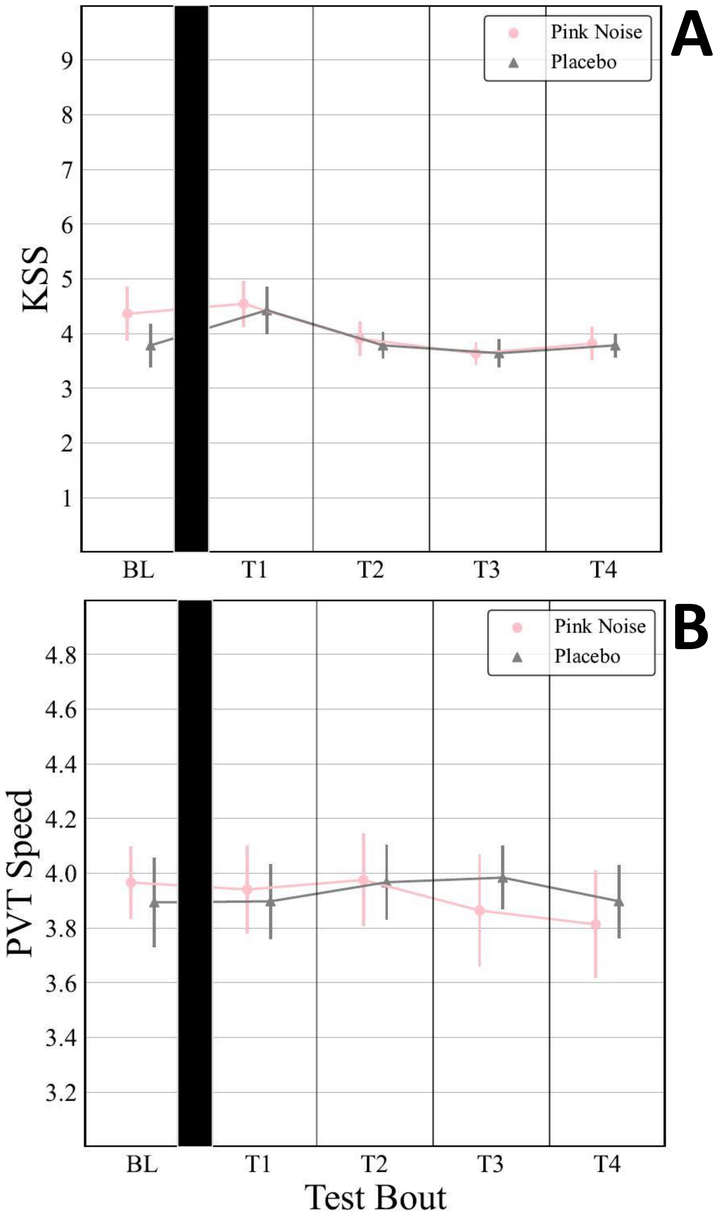

Fig. 2: Mean ± SEM for (A) Karolinska Sleepiness Scale (KSS) and (B) psychomotor vigilance task (PVT) speed across test bouts by condition (pink noise intervention: pink circles; no-sound control ("Placebo"): gray triangles).

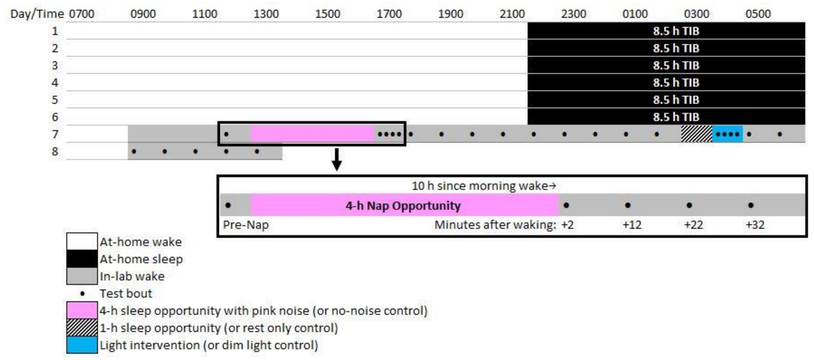

Fig. 1: Study protocol schematic

Results

- There was no difference in sleep inertia outcomes between conditions
- There was a significant effect of test bout for KSS with the greatest sleepiness experienced 2 minutes after the end of the nap opportunity (p = .004, ω^2_p = .10) (Fig. 2A)
- There were no other significant main or interaction effects for KSS, PVT speed, or PVT lapses (all p > .05) (Fig. 2)

Discussion

- These preliminary findings suggest subjective alertness and objective vigilant attention are not different in the 40 minutes following a daytime nap opportunity with pink noise compared to a no-noise control
- Future analyses will investigate how sleep metrics may have influenced these results and will compare additional conditions

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