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## Introduction

- Waking from sleep, especially slow wave sleep (SWS), is associated with reduced alertness known as sleep inertia.
- Light alertness improves during deprivation and circadian misalignment.
- In this study, we assessed the efficacy of light to improve alertness and mood immediately after waking from SWS.

# Methods

- Twelve participants (6 female; 23.3 ± 4.2 y) kept a sleep schedule of 8.5 h for 5 nights and 5 h for one night prior to the overnight laboratory visit (confirmed by actigraphy) (Fig. 1).
- During the lab visit, sleep was monitored using polysomnography. After at least 5 min of SWS, participants were awoken and exposed to either blue-enriched light (LIGHT) or dim, red light (CONTROL) for 1 h (Fig. 2).
- Karolinska Sleepiness Scale (KSS) and visual analogue scales (VAS) of mood were completed pre-sleep (baseline) and at 2 min, 17 min, 32 min, and 47 min after waking (Fig. 1, inset).
- Following testing, all lights were turned off and participants returned to sleep before being woken from SWS again and exposed to the opposite condition (LIGHT or CONTROL).

# Light Improves Alertness and Mood during the SJSU Sleep Inertia Period following Slow Wave Sleep

sleep



Fig. 1: Study protocol showing at-home sleep schedule and inlaboratory testing. Times are approximate as participants kept their habitual bedtimes. Order of intervention and control was randomized.



Fig. 2: Examples of the test set up in the blue-enriched light intervention (LIGHT) and dim, red light condition (CONTROL). Participants were seated on the edge of the bed during the testing period.



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# **Statistics**

condition\*time, a

# Results

# Conclusion

- Exposure immediately
- performance.

## Support

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Data were analyzed using a linear mixed-effects model with fixed effects of condition, time, and intercept random by participant, and a covariate of the average of baseline tests bouts (pre-sleep).

Compared to the control condition, participants exposed to blue-enriched light reported feeling more alert (KSS:  $F_{1.77}$ =4.955, p=.029; VAS<sub>alert</sub>:  $F_{1.77}$ =8.226, p=.005), more cheerful (VAS<sub>cheerful</sub>:  $F_{1.77}$ =8.615, p=.004), less depressed (VAS<sub>depressed</sub>:  $F_{1,77}$ =4.649, p=.034), and less lethargic (VAS<sub>lethargic</sub>: F<sub>1,77</sub>=5.652, p=.020) (Fig.3).

light blue-enriched to after waking from SWS during the biological night may help to improve subjective alertness and mood.

Future analyses will explore whether these findings extend to effects on cognitive