An At-Home Evaluation of a Light Intervention to Mitigate Sleep Inertia Symptoms

Cassie J. Hilditch, PhD
# Conflict of Interest Disclosures for Speakers

1. Within the past 24 months, I have not had/do not currently have any relationships with any ineligible companies whose primary business is producing, marketing, selling, re-selling, or distributing healthcare products used by or on patients, **OR**

2. Within the past 24 months, I have had/currently have the following relationships with ineligible companies whose primary business is producing, marketing, selling, re-selling, or distributing healthcare products used by or on patients.

<table>
<thead>
<tr>
<th>The Nature of the Relationship(s)</th>
<th>The Name(s) of the Ineligible Company(ies)</th>
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<tr>
<td>Royalties/Patient Beneficiary</td>
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<td>Intellectual Property Rights/Ownership Interest</td>
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<td>Stock/Stockholder</td>
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<td>Grand/Research</td>
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<td>Consultant, Employee Advisor, Independent Contractor, Executive Role</td>
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<td>Investigational Device/Drug</td>
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<td>Other Financial/Material Support</td>
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3. The material presented in this lecture has no relationship with any of these potential conflicts, **OR**

4. This talk presents material that is related to one or more of these potential conflicts, and the following objective references are provided as support for this lecture:

1.  
2.  
3.  

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SLEEP 2022 Photography Policy

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- Photographs from this lecture are only allowed for personal, social, or non-commercial use.
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Background

• Light has acute alerting properties
• Improved PVT lapses, alertness, mood in-lab following slow wave sleep

(Hilditch et al., 2022 J Sleep Res)
Aim:
To test the efficacy of exposure to a blue-enriched light upon waking from sleep at night to improve alertness, mood, and cognitive performance in an at-home setting
Participants

$n = 36$ completed

- 18 F, 17 M, 1 NB
- 18-40 y
- General Health Questionnaire, psychiatric questionnaires (e.g., BDI, STAI)
- Min. 6h time-in-bed; bedtime 9am-3am

$n = 8$ excluded

- screening questionnaires ($n = 6$)
- incomplete data ($n = 2$)
One-week at-home study

- Nights 1-7: Actiwatch, sleep diary
- Night 6: EEG habituation, set up equipment, practice tests
- Night 7: BL, intervention, testing, EEG
Translation to the field

Personal photos

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Outcome measures

• PVT (pending latency correction)
• Descending Subtraction Task (DST)
• Mood (visual analog scales)
• Karolinska Sleepiness Scale (KSS)

Analysis

• Mixed-effects models
• Fixed effects: Condition, Test, C*T
• Random effect: Participant
• Covariates: Order, Sex, BL
Results: Sleep

<table>
<thead>
<tr>
<th>Sleep stage at wake-up</th>
<th>Light</th>
<th>Control</th>
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<tbody>
<tr>
<td>N1</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>N2</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>N3</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>REM</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Wake</td>
<td>1</td>
<td>2</td>
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Results:

DST (by cond)

Test: $\chi^2 [3] = 17.42; p < .001$
Results: Mood (by cond)

Test: $F(3, 238) = 6.10; p < .001$
Results: KSS (by cond)

NSD for cond, test, cond*test
Sex significant predictor: $F(1, 30) = 10.26; p = .003$
Results:
KSS (by sex)

Sex: $F(1, 32) = 11.46; p = .002$
Test: $F(4, 165) = 58.22; p < .001$
Sex*Test: $F(4, 165) = 4.10; p = .003$
Discussion

• Light does not appear to improve DST, KSS, or mood in at-home setting
  - Other neurobehavioral domains?
  - Different device/exposure?

• Sex differences in the perception of sleep inertia?

• Influence of sleep?
Research was performed in collaboration with the Naval Postgraduate School, who was funded by the Naval Medical Research Center's Naval Advanced Medical Development Department (MIPR N3239820WXHN007). Additional support was provided by the NASA Airspace Operations and Safety Program, System-Wide Safety.