

## Background

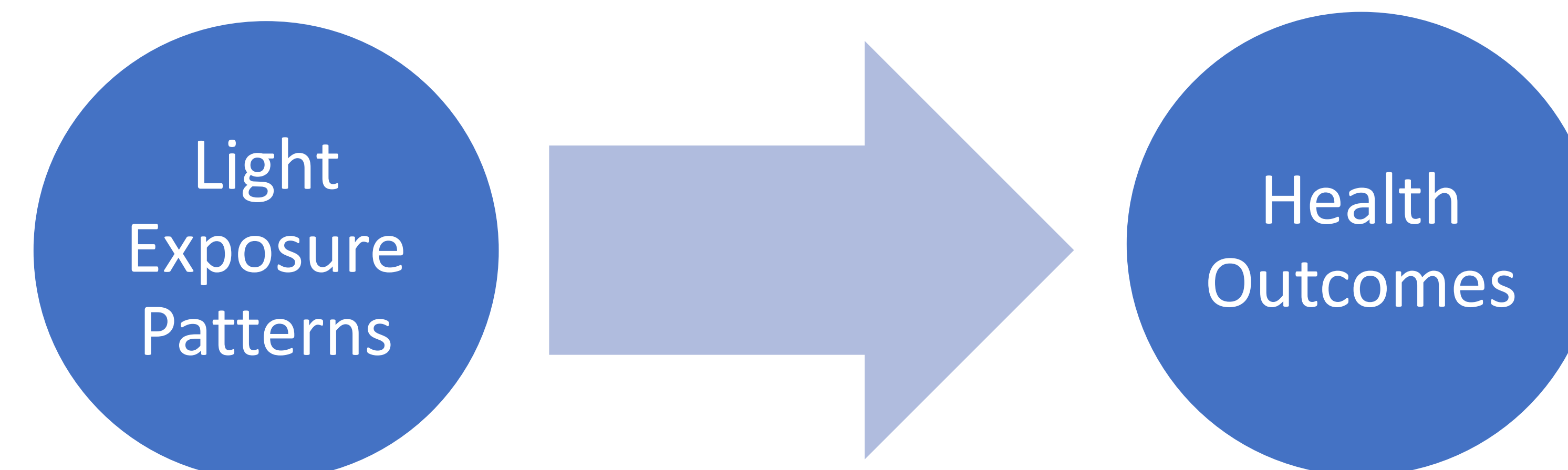
- Light exposure regulates circadian rhythms, impacting sleep.
- Bi-directional relationship:
  - Poor sleep -> AD/ADRD Progression
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- Poor sleep, especially night awakenings, often forces a move from home care to institutional care.
- Strong evidence of the benefit of “bright days and dark nights” for AD/ADRD sleep, circadian entrainment, and overall health (see below).

# Using Light Exposure to Improve Sleep and Circadian Health for People with Alzheimer’s Disease

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## Development – The Speck Light Exposure System

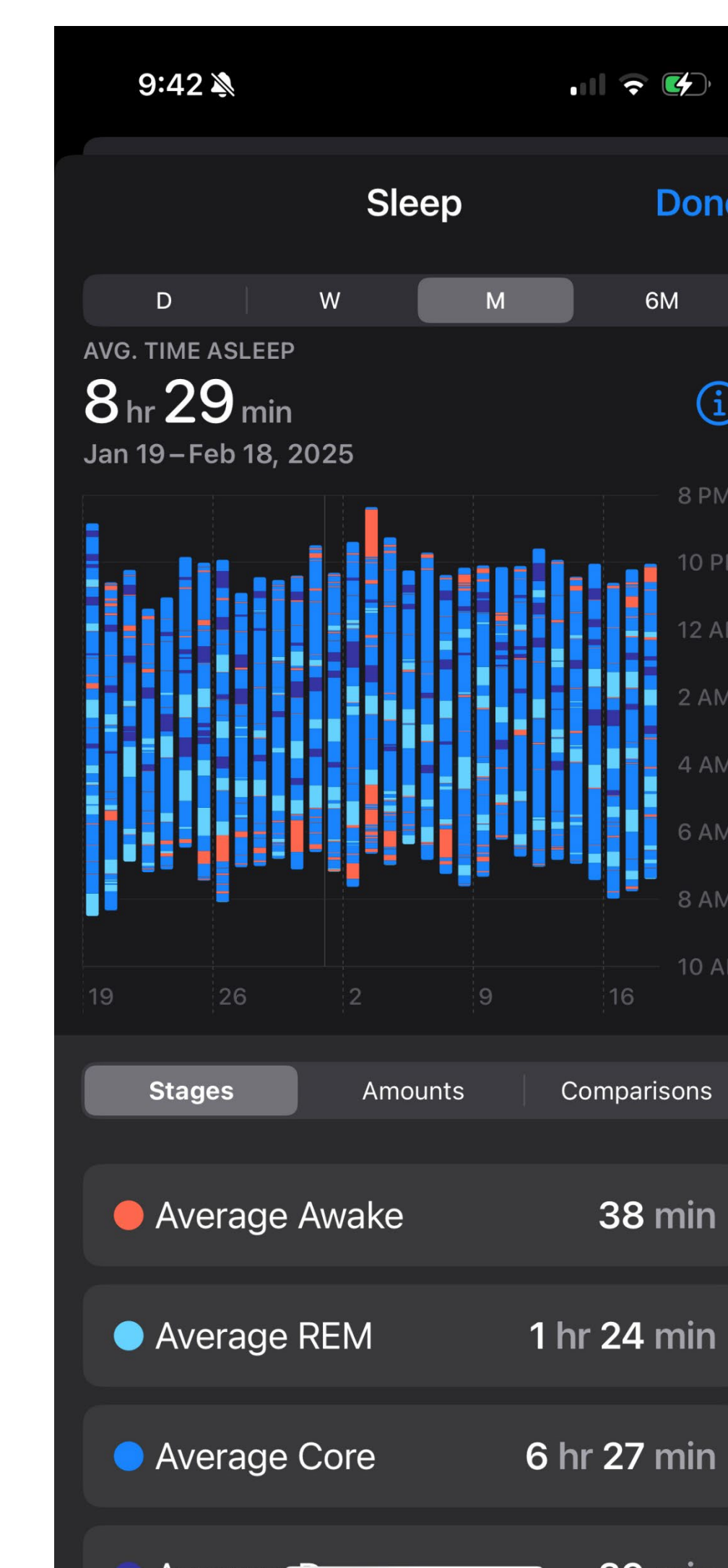
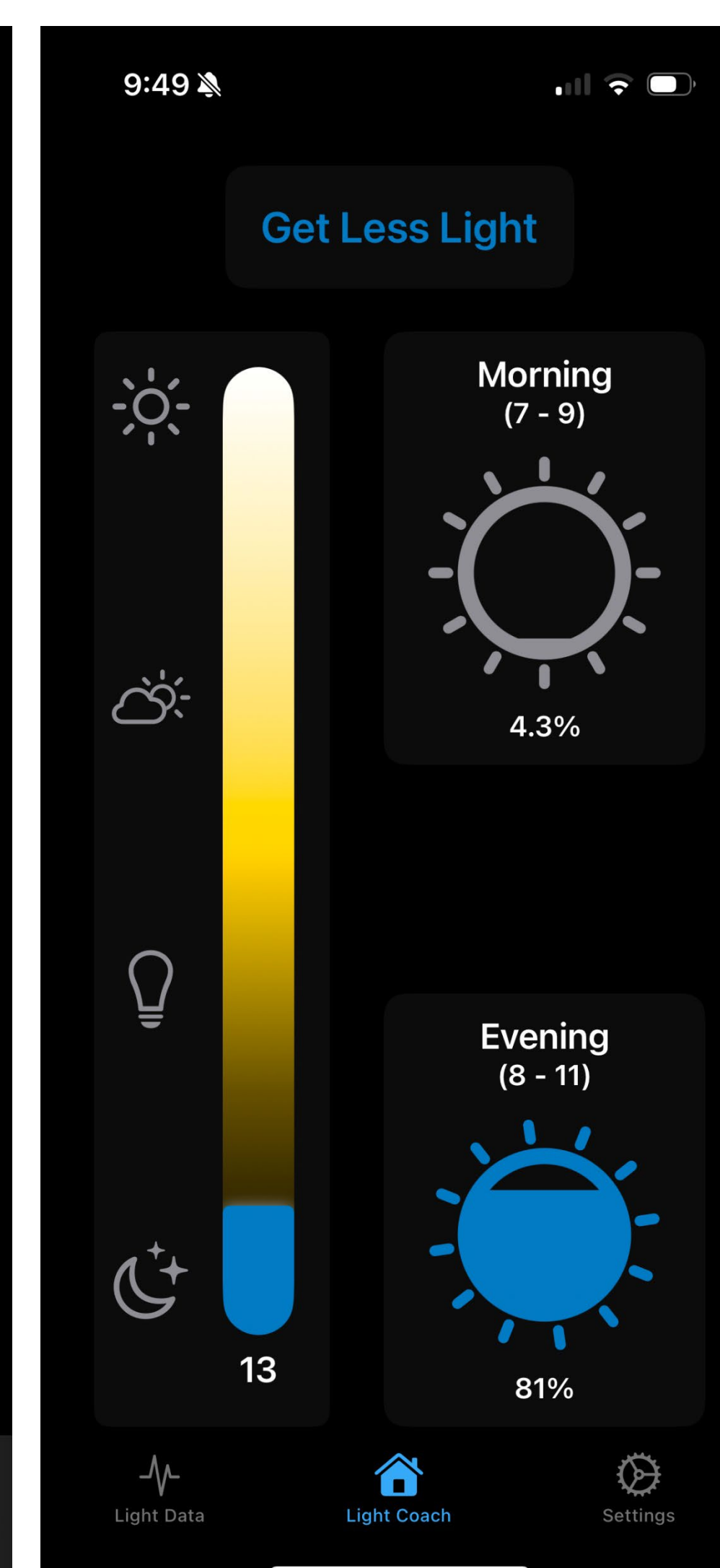
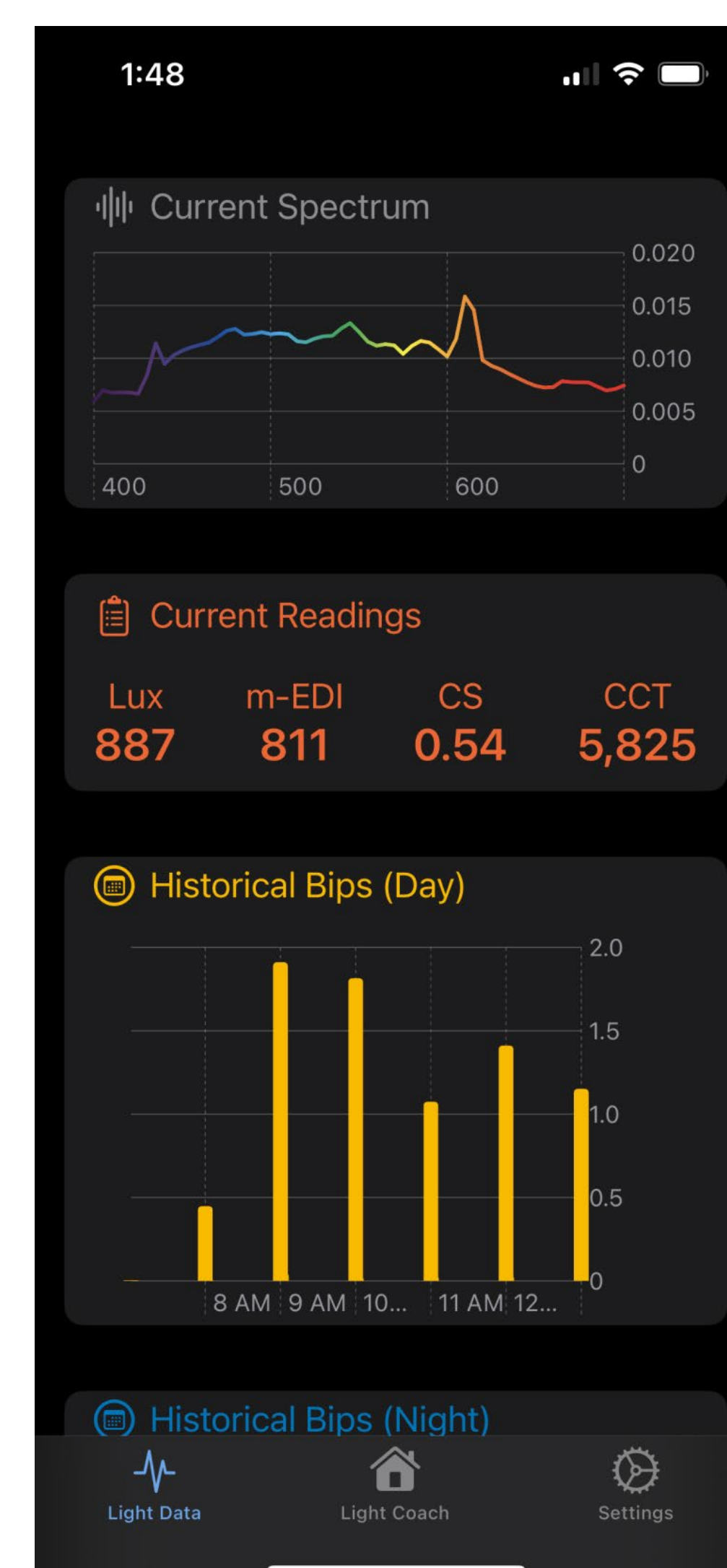
- The Speck wearable continuously records the intensity and spectrum of light exposure.
- The Speck Connect app combines light exposure data with sleep tracking data to identify light exposure patterns that improve sleep.
- The Blue Iris Light Coach helps people to get better light exposure to improve sleep and health.



### Measurable Signals

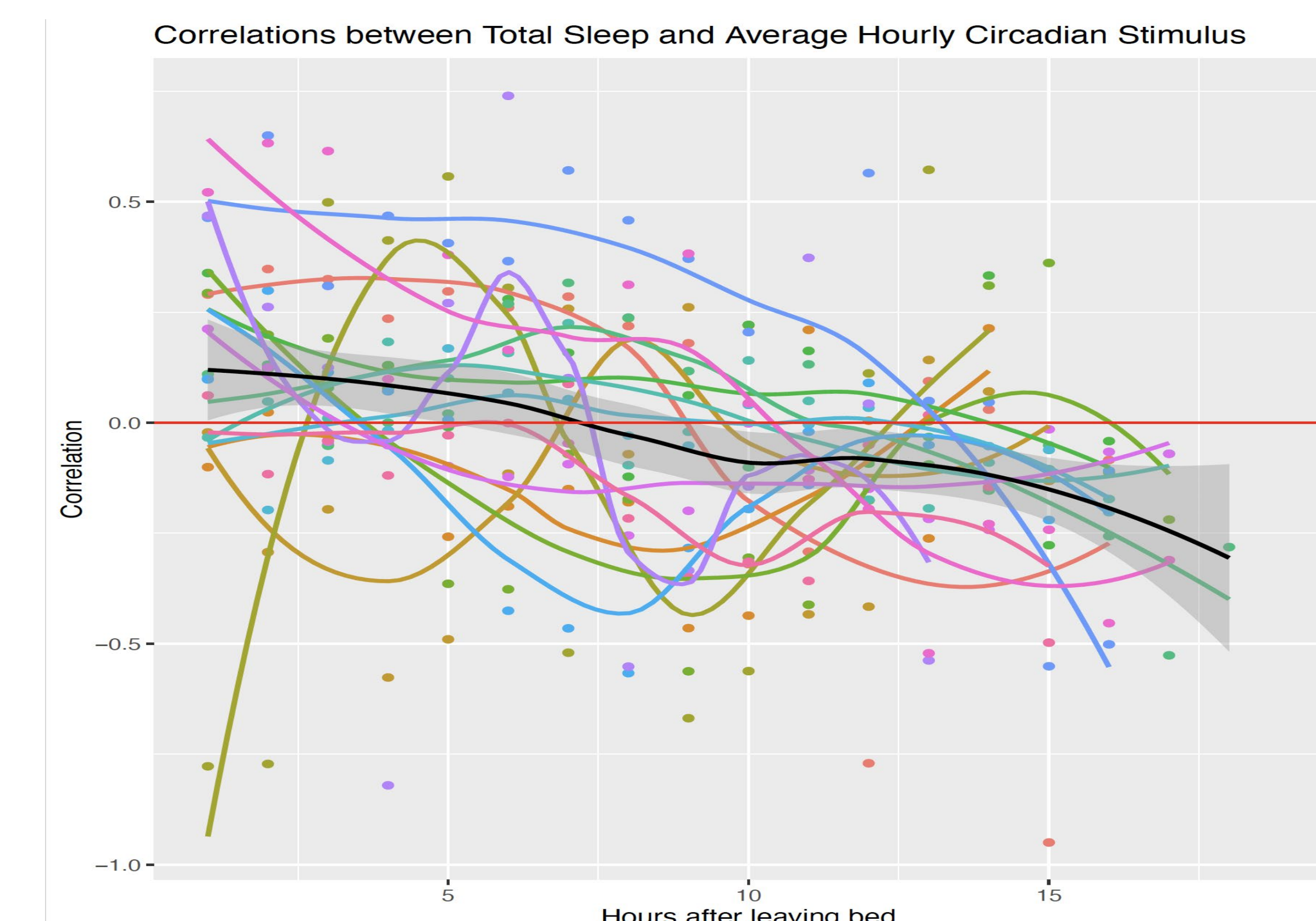


### Measurable Outcomes



## Results

- 28 Participants wore Speck light sensors and Apple Watches (for sleep metrics) during a 1-2 month a2 pilot study.
- 16 participants were “highly compliant” with at least 21 days in which they wore the Speck for at least 12 hours and gathered valid sleep data that evening.
- As a group, the participants showed positive correlations between getting “bright days and dark nights” and sleep metrics.



## Commercialization

- In 2025, we plan to begin selling the Speck as a general wellness device designed to improve circadian entrainment and sleep for people with AD/ADRD.
- We will market directly to people with AD/ADRD and their families.
- We are also looking for healthcare partners (care facilities, providers, etc.) who are interested in helping people with AD/ADRD.

## Acknowledgments

The Speck light exposure system was developed in part with funding from the National Institute on Aging under grants P30AG073107 and 6R44AG060857-04.

## Citations on Light Therapy and AD/ADRD

*“Our systematic review and meta-analysis suggests that phototherapy is a promising intervention, as it can improve cognitive function in older patients with dementia.”*

2023. Lu, X., Liu, C., & Shao, F. *Phototherapy improves cognitive function in dementia: A systematic review and meta-analysis*. Brain and Behavior, 13, e2952. <https://doi.org/10.1002/brb3.2952>

*“The findings of this meta-analysis demonstrate that light therapy is effective in improving sleep, cognition, and decreasing depression and neuropsychiatric behaviors for people living with dementia.”*

2023. Fong, K. N. K., Ge, X., Ting, K.-H., Wei, M., & Cheung, H. (2023). *The Effects of Light Therapy on Sleep, Agitation and Depression in People With Dementia: A Systematic Review and Meta-analysis of Randomized Controlled Trials*. American Journal of Alzheimer's Disease and Other Dementias, 38. <https://doi.org/10.1177/15333175231160682>

*“In conclusion, a course of 4-week light therapy significantly suppressed delirium in patients with AD. The combined effects of light therapy and conventional treatment were superior to that of conventional treatment alone. Caregiver burden was also reported to decrease.”*

2022. Zou C et al., *The Effects of Light Therapy on Sleep, Depression, Neuropsychiatric Behaviors, and Cognition Among People Living With Dementia: A Meta-Analysis of Randomized Controlled Trials*. The American Journal of Geriatric Psychiatry, Volume 32, Issue 6, 681 - 706  
Directors Association, Volume 23, Issue 10, 1698 - 1704.e2

*“Light therapy leads to significant improvement in sleep and psychobehavioral symptoms and is associated with relatively fewer side effects in patients with AD, indicating its potential as a promising treatment option for AD.”*

2023. Zang L, Liu X, Li Y, Liu J, Lu Q, et al. (2023) *The effect of light therapy on sleep disorders and psychobehavioral symptoms in patients with Alzheimer's disease: A meta-analysis*. PLOS ONE 18(12): e0293977. <https://doi.org/10.1371/journal.pone.0293977>