

# Late Evening Room Light and Sleep Restriction Reverses the Phase Advancing Effect of Bright Morning Light in Adolescents



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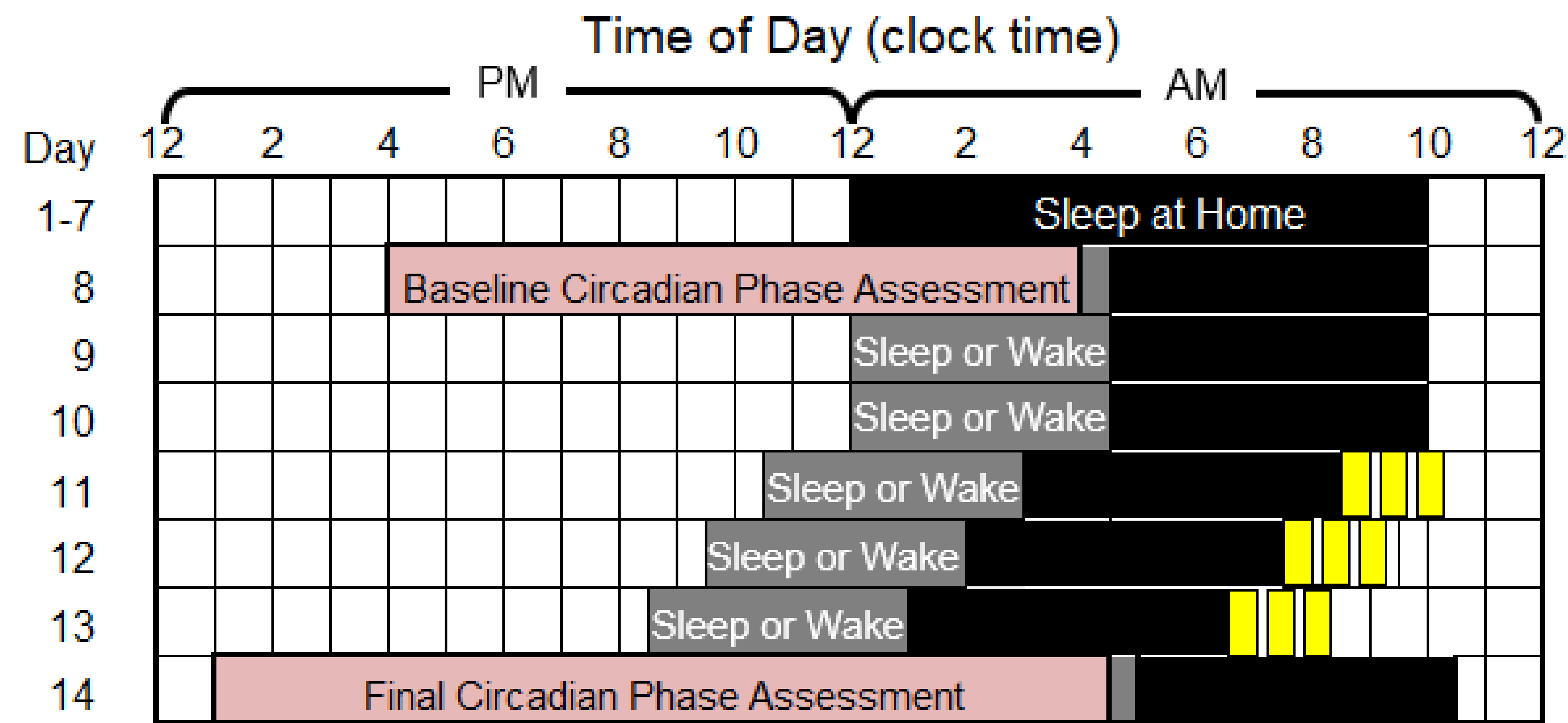
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## STUDY QUESTION

Does sleep restriction due to staying awake late reduce the phase advancing effects of morning bright light in adolescents?

## METHOD

**Participants:** 38 adolescents (14.1-18.0 y); 21 female at birth; 17 male at birth



**Study design:** (example protocol above)

Days 1-7: 10-h sleep/dark at home (baseline)

Days 8-14: Laboratory stay

- Days 9 & 10: Bedtime **0h** (control; n=9), **1.5h** (n=9), **3.0h** (n=12), or **4.5h** (n=8) later than baseline. Room light ~100 lux.
- Days 11-13: 3-day gradual advance of sleep/wake + morning bright light (7,000 – 10,000 lux).
- Days 8 & 14: Dim Light Melatonin Onset (DLMO) measured in < 5 lux.

## CONCLUSIONS

- Adolescents usually go to bed late and restrict their sleep on school nights. These behaviors may contribute to a reduced response to morning bright light.
- Behavioral treatments for adolescents requiring phase advances to get earlier need to consider evening light exposure and sleep duration in their plans.

**SUPPORT:** R01 HL146772 (SJC)

Teens who are sleep restricted by staying awake late in room light

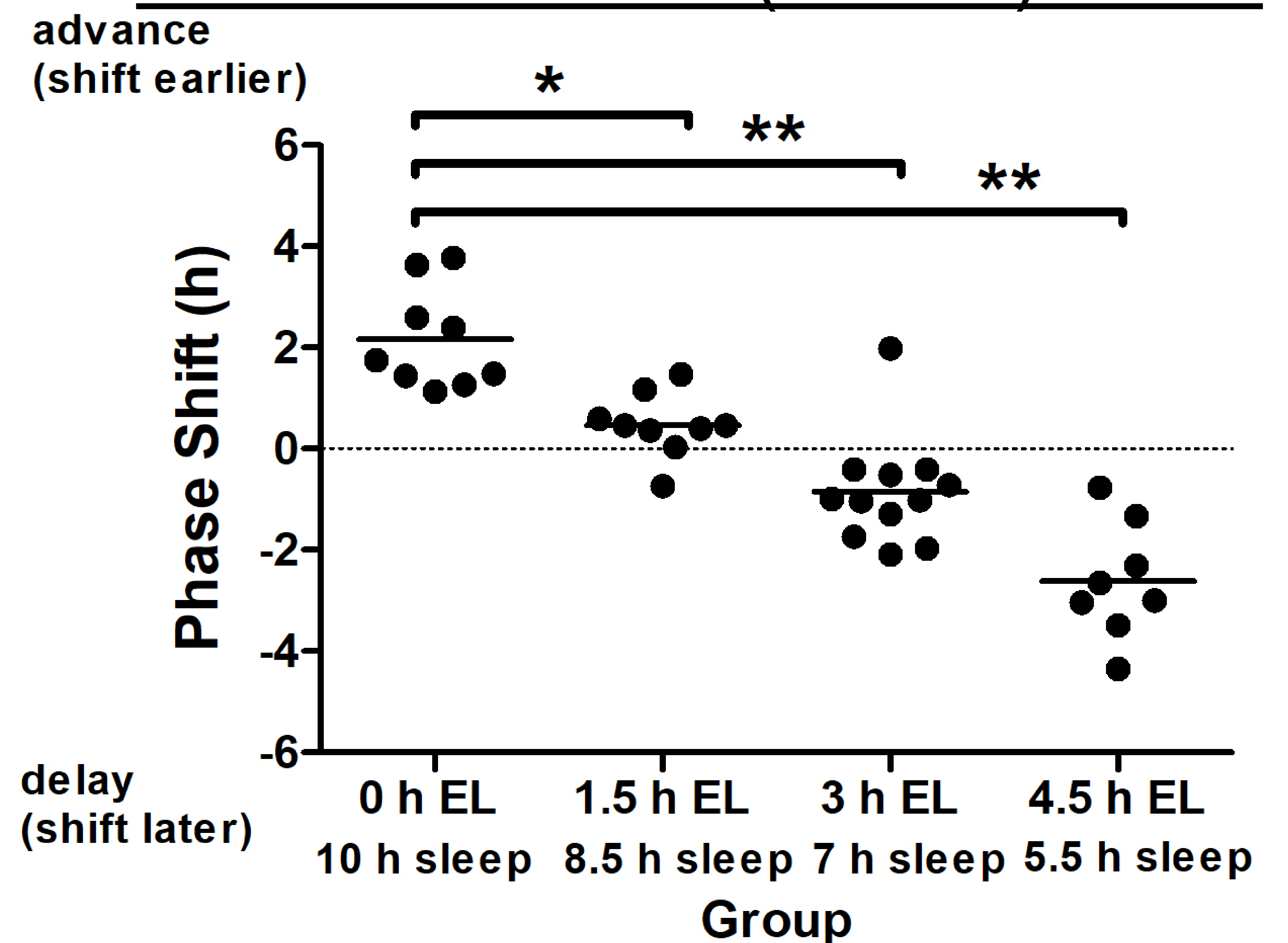
*advance less*

or

*shift the wrong way (delay)*

to morning bright light

## Circadian Phase (DLMO) Shifts



**EL = Evening Light**

Phase shifts differed among groups [ $F(3,34)=36.7$ ,  $p<.001$ ].

\* $p<.05$ ; \*\* $p<.01$