

# Ameliorations in Both Mood and Subjective Sleep Following Light Therapy

An Open-Label Light Therapy Intervention Study



University of Ottawa  
**Institute of Mental  
Health Research**

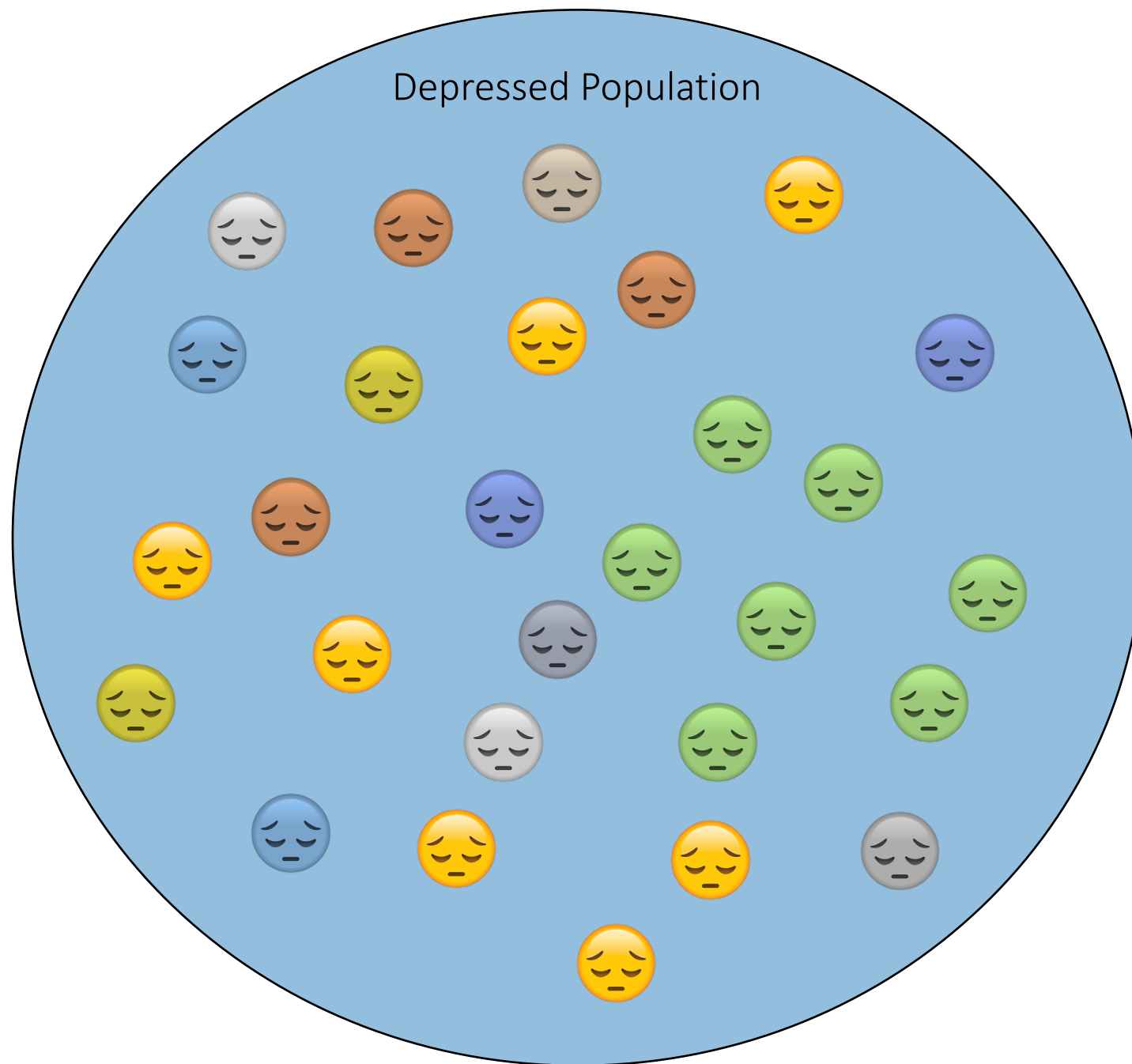
## Past Research



- Small Sample Size
- Questionable Placebo
- Randomization not Specified
- Heterogeneity in Sample

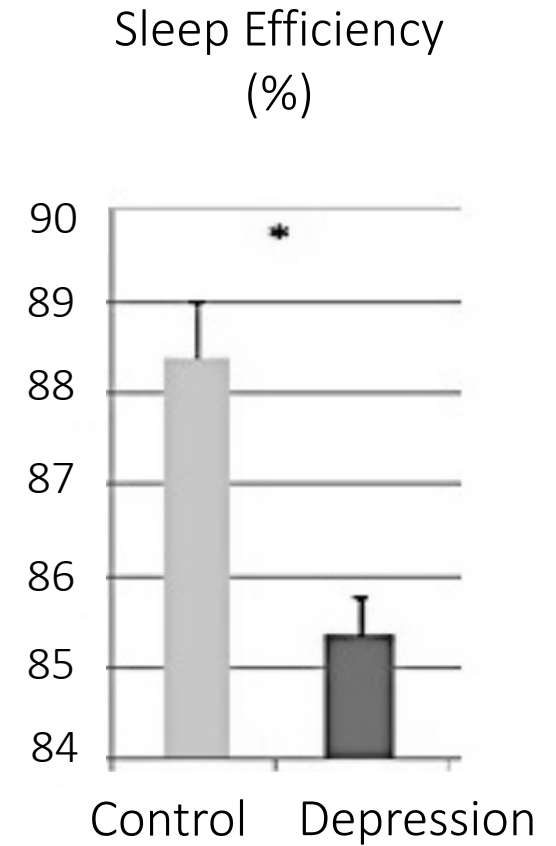
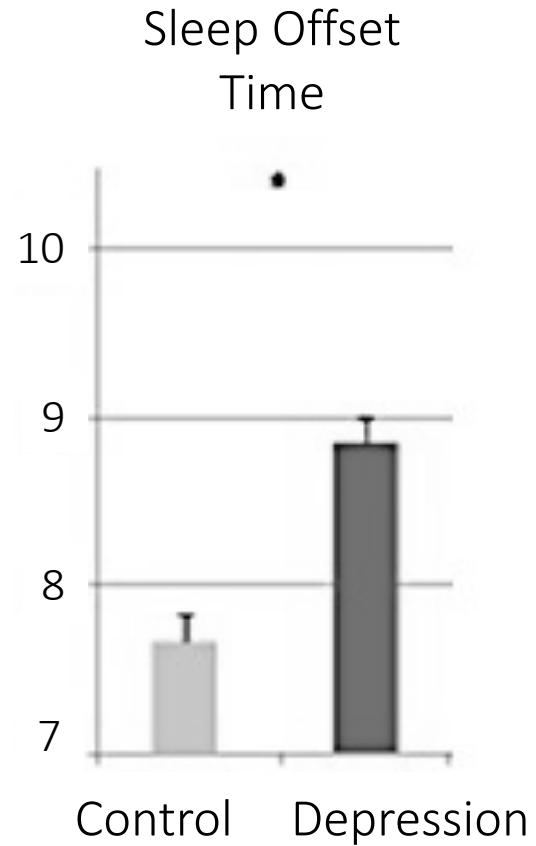
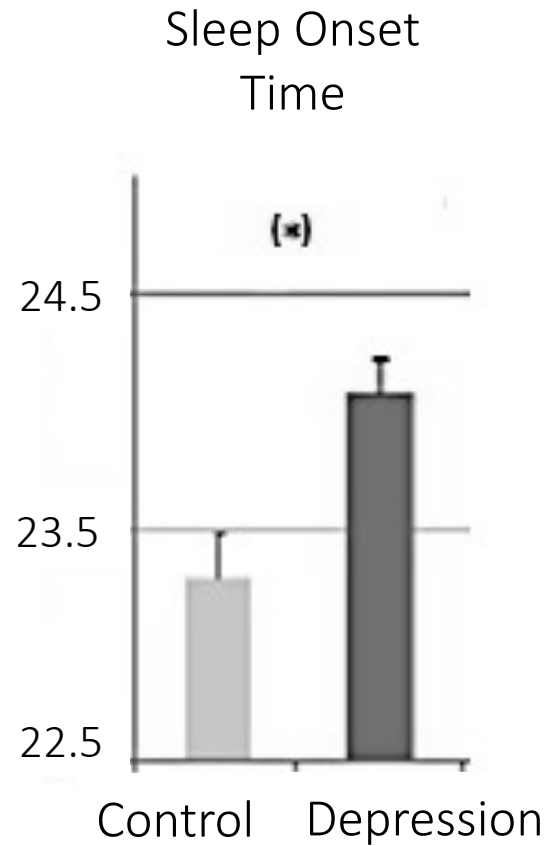
Small-to-moderate effect in reducing symptoms  
as compared to control treatment

Possible  
Reasons?



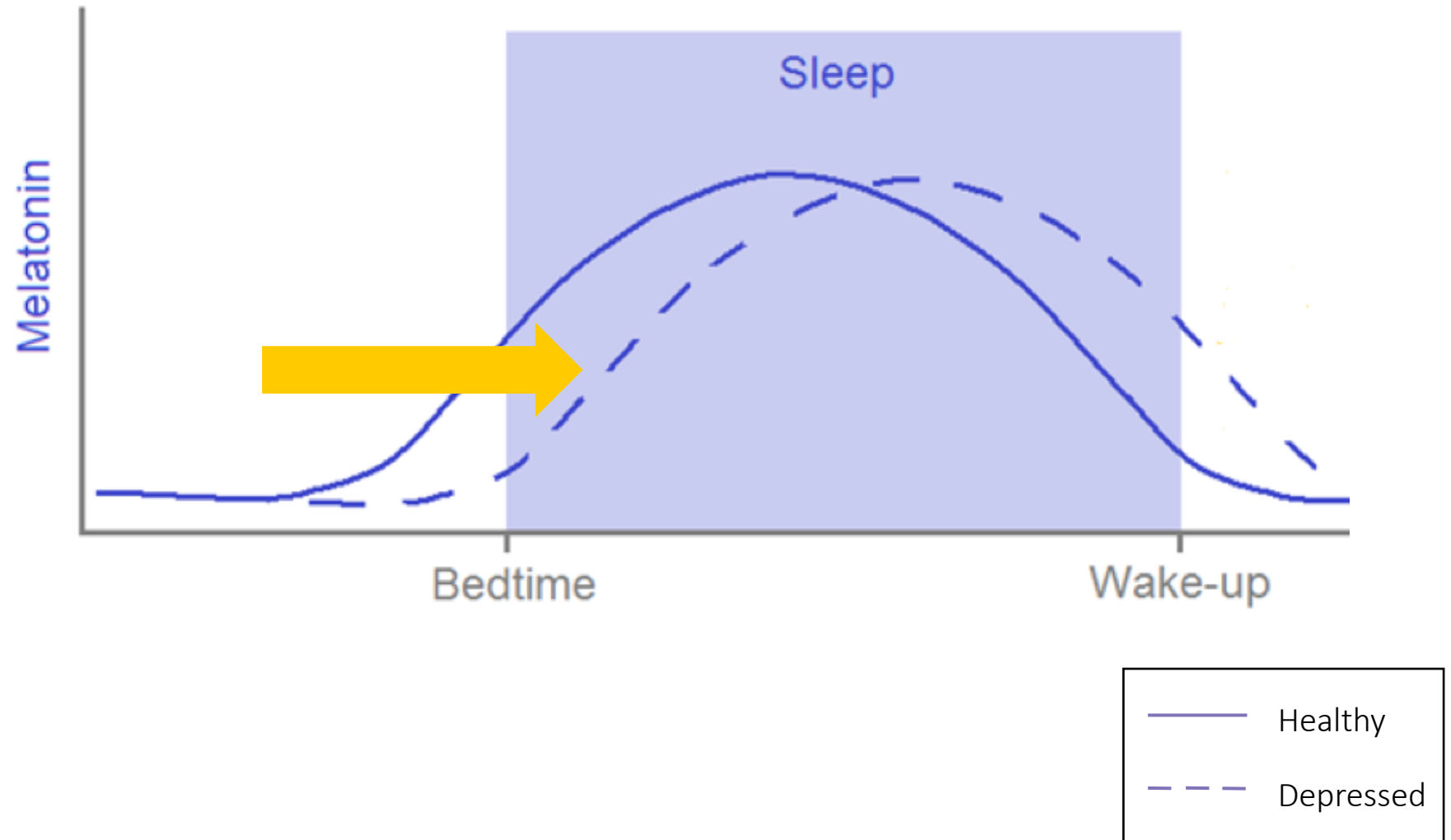
# Depressed Vs. Healthy

Phase Delay



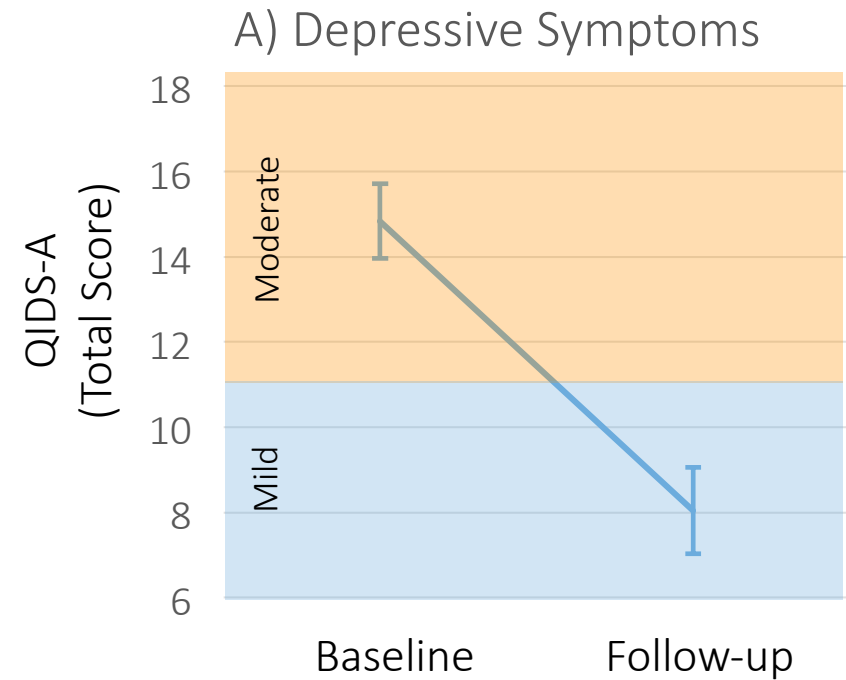
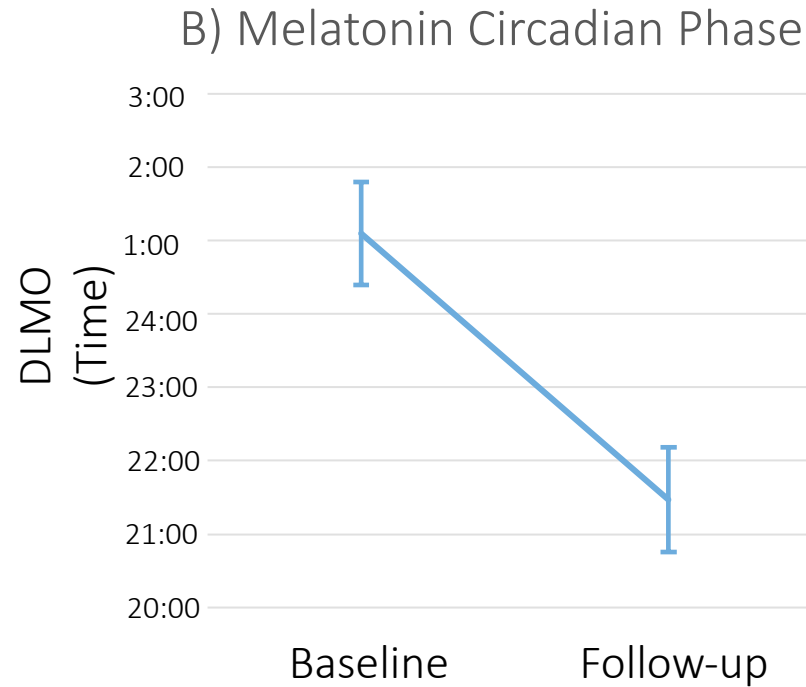
# Circadian Disruptions

## Melatonin

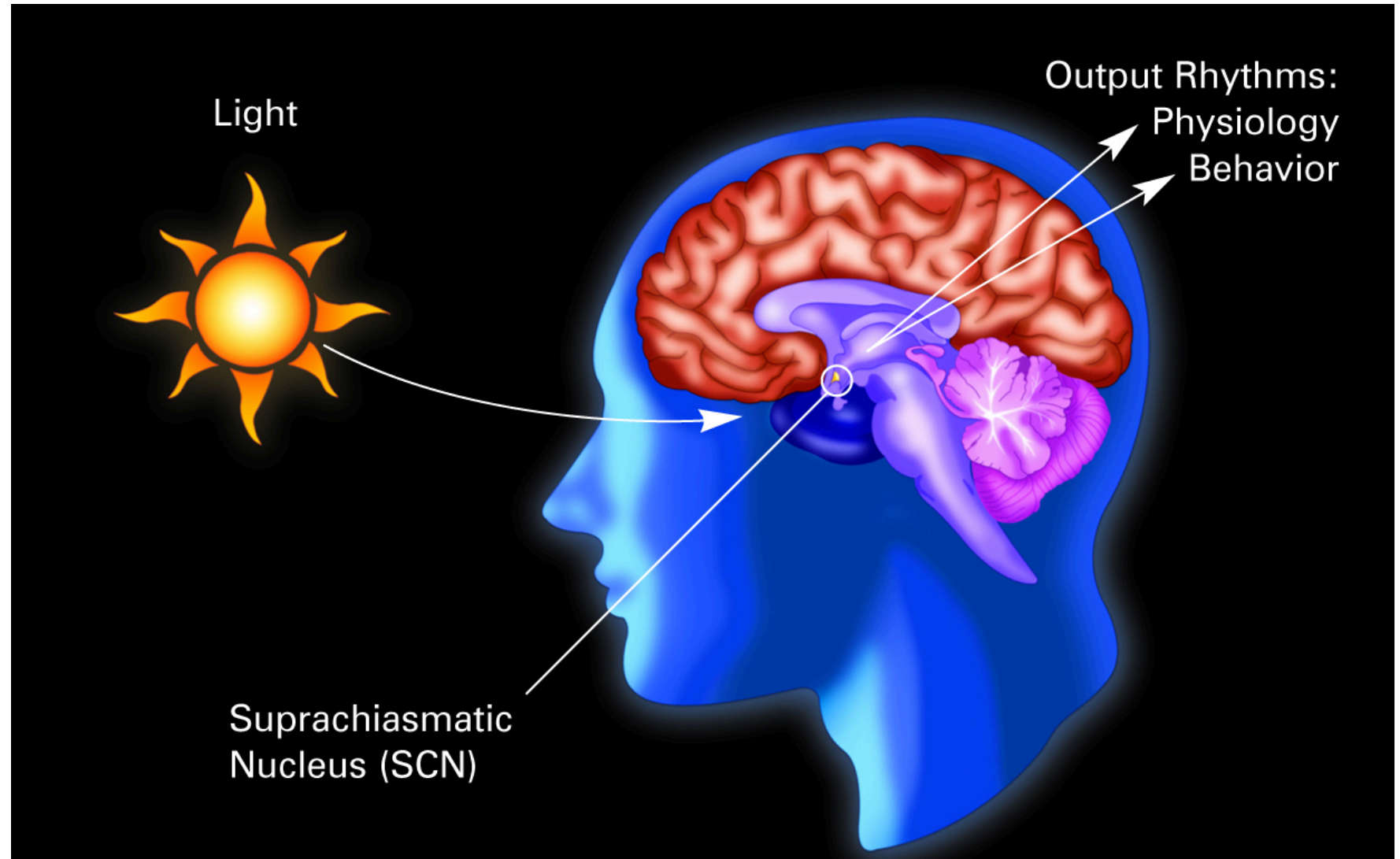


# Circadian Disruptions

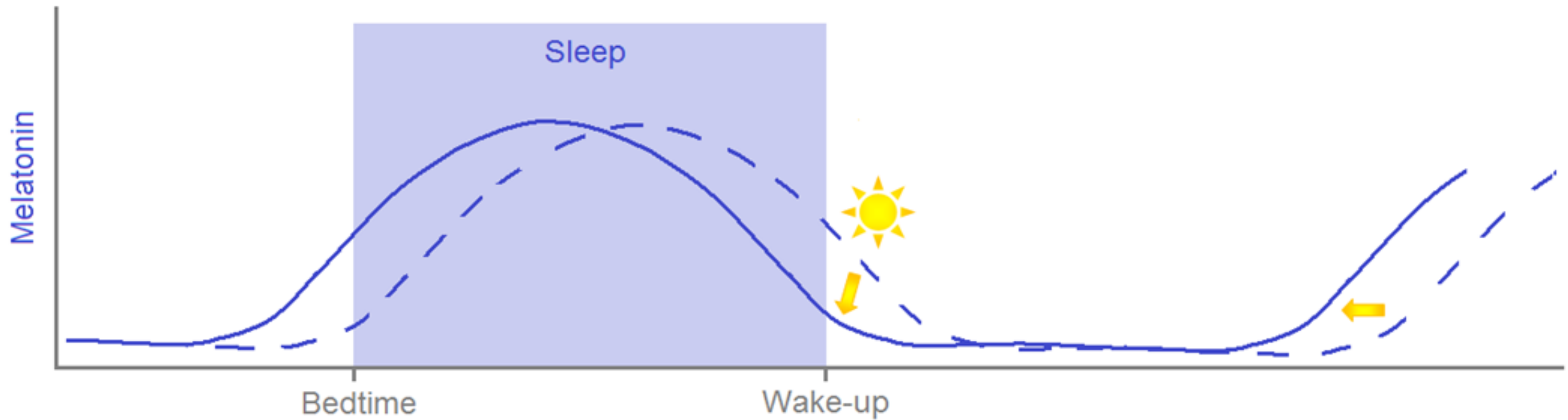
## Melatonin



# The Impact of Light



# The Impact of Light





Main Objective: to evaluate whether the antidepressant effects of light therapy in young people with depression are modulated by changes in the sleep-wake cycle

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## Hypotheses

- A) An improvement in mood will occur following light therapy
- B) An improvement in depressive symptoms will correlate with an improvement in sleep (across time points)
- C) Those with poorer sleep will demonstrate a greater reduction in depressive symptoms

# Participants

## Descriptive Statistics

Sex Distribution

17% male

Age (years)

Range [15-30]

Mean (SD)  
21.2 (4.9)

24 Participants:

12 from - Brain and Mind  
Centre (Sydney)

12 from – ROMHC  
(Ottawa)

Comorbidity (n (%))

Anxiety Disorder  
(15 (63%))

Baseline BDI  
(measure of depressive  
symptoms severity)

Means (SD)  
23.4 (9.3)

Minimal depression: 0-14  
Mild depression: 15-20  
Moderate depression: 21-29  
Severe depression: 30-63

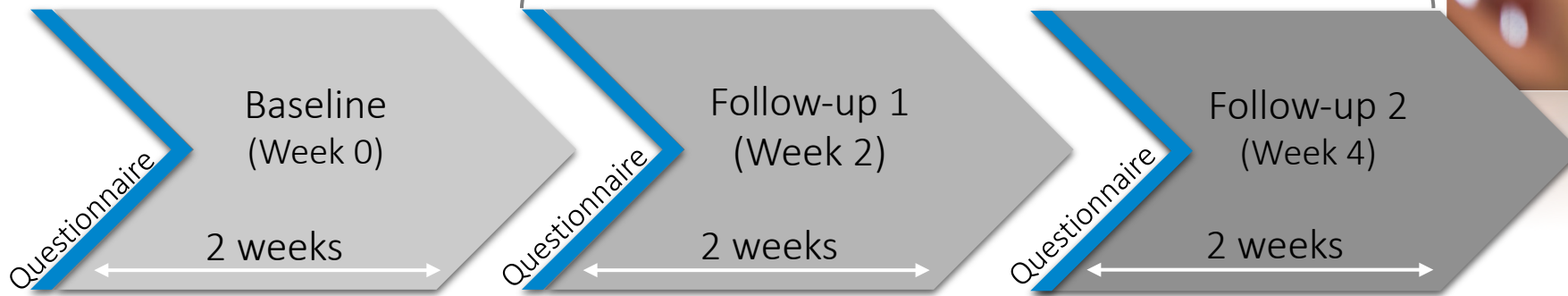
Medication (n(%))

Taking Psychotropic Medication  
(14 (58%))

# Procedures

## Light Therapy

- 60min – after sleep offset
- 500 nm dominant wavelength (UV-free)
- High setting – 506 Lux lm/m<sup>2</sup> & 230 µW/cm<sup>2</sup>
- Low setting – 315 Lux lm/m<sup>2</sup> & 143 µW/cm<sup>2</sup>
- Light Pulse – 50 to 166 Hz



## Measures / Equipment

- Beck Depression Inventory-II (BDI)
  - One of the most frequently used tools to assess depression severity
- The Glasgow Content of Thoughts Inventory (GCTI)
  - Characterises the content, character, and intrusiveness of cognitions occurring prior to sleep initiation
  - indicate the frequency of each 'thought' using the following answer key: Never, Sometimes, Often, Always.
- Leeds Sleep Evaluation Questionnaire (LEEDS)
  - Used to track changes in sleep quality
  - Sub categories -initiating sleep (GTS), general sleep quality (QOS), the ease of waking up in the morning (AFS), and the quality of wakefulness (BFW)



# LEEDS Questionnaire

<b>How would you describe the way you currently fall asleep in comparison to usual?</b>			<b>GTS - getting to sleep</b>
1.	More difficult than usual _____	Easier than usual	
2.	Slower than usual _____	More quickly than usual	
3.	I feel less sleepy than usual _____	More sleepy than usual	
<b>How would you describe the quality of your sleep compared to normal sleep?</b>			<b>QOS - quality of sleep</b>
4.	More restless than usual _____	Calmer than usual	
5.	With more wakeful periods than usual _____	With less wakeful periods than usual	
<b>How would you describe your awakening in comparison to usual?</b>			<b>AFS – Awake following sleep</b>
6.	More difficult than usual _____	Easier than usual	
7.	Requires a period of time longer than usual _____	Shorter than usual	
<b>How do you feel when you wake up?</b>			<b>BFW – behaviour following wakening</b>
8.	Tired _____	Alert	
<b>How do you feel now?</b>			
9.	Tired _____	Alert	
<b>How would you describe your balance and co-ordination upon awakening?</b>			
10.	More disrupted than usual _____	Less disrupted than usual	

## A) An improvement in mood will occur following light therapy

- BDI (mood) - Repeated measures t-test

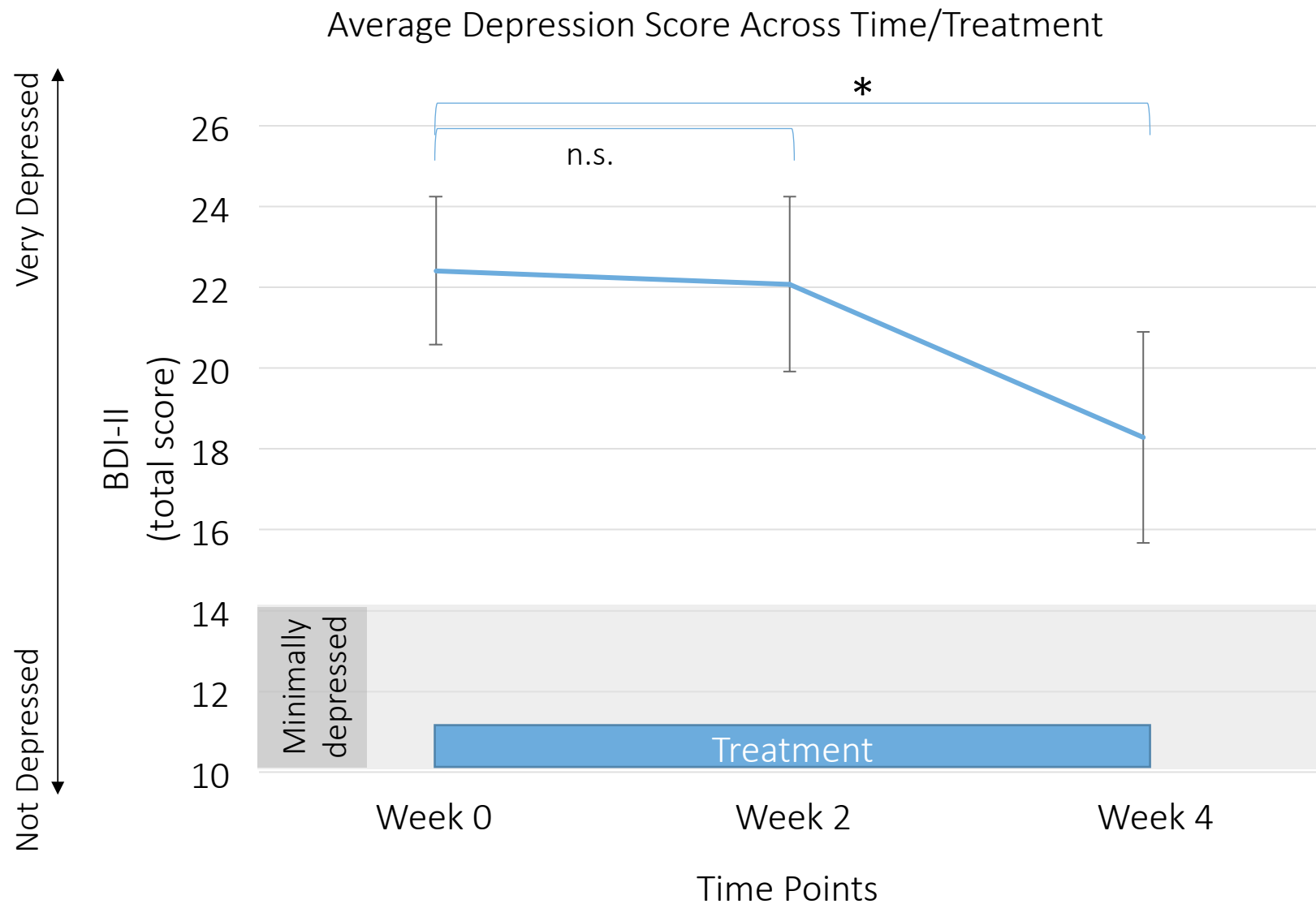
## B) Improvements in depressive symptoms will correlate with improvements in sleep (across time points)

- Correlations between the % of change in depressive symptoms and sleep from baseline (Week 0) to follow-ups (Week 2; Week 4)
  - Early Intervention;  $(\text{Week 0} - \text{Week 2}) / \text{Week 0} * 100$
  - Later Intervention;  $(\text{Week 2} - \text{Week 4}) / \text{Week 2} * 100$

## C) Those with poorer sleep will demonstrate a greater reduction in depressive symptoms

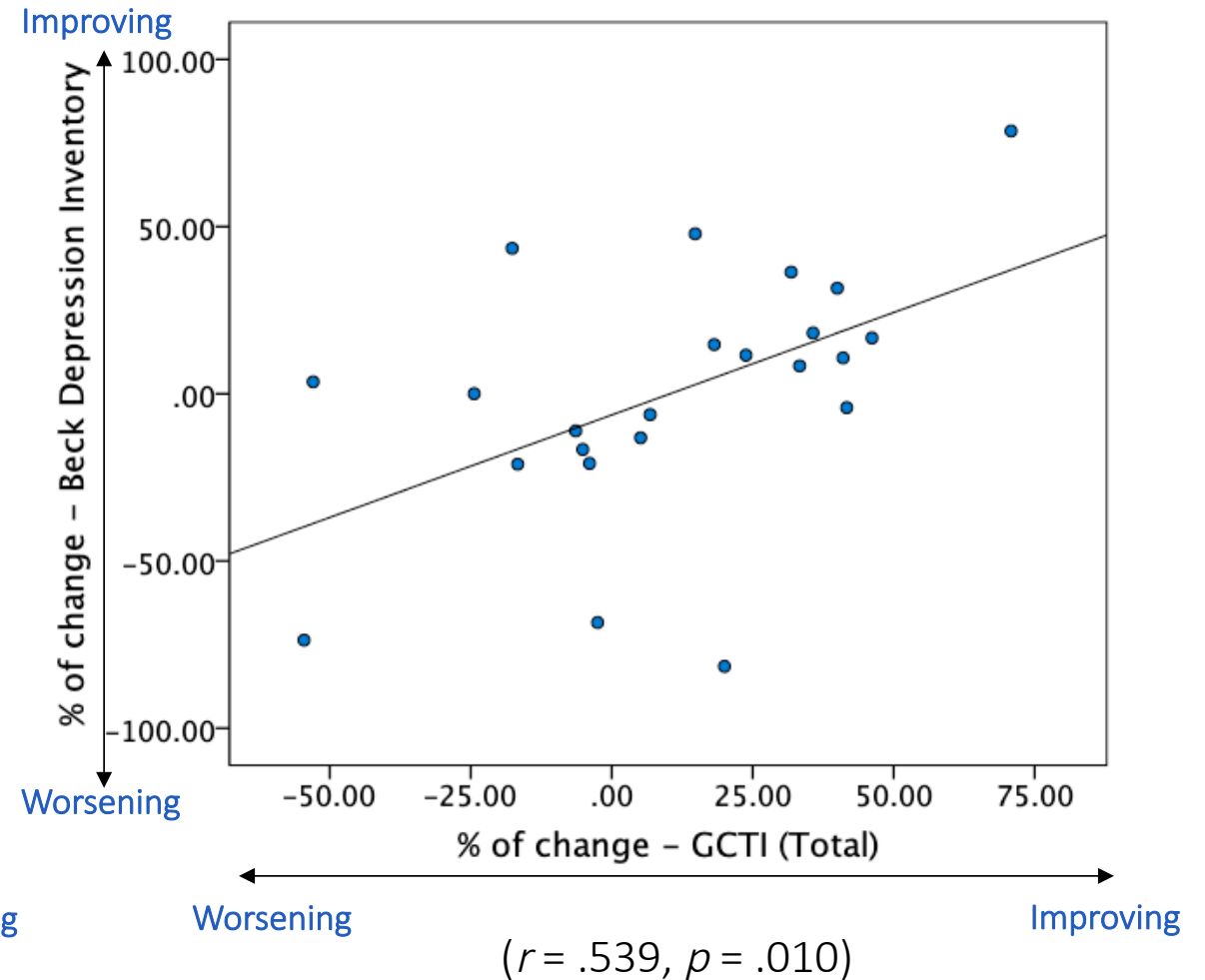
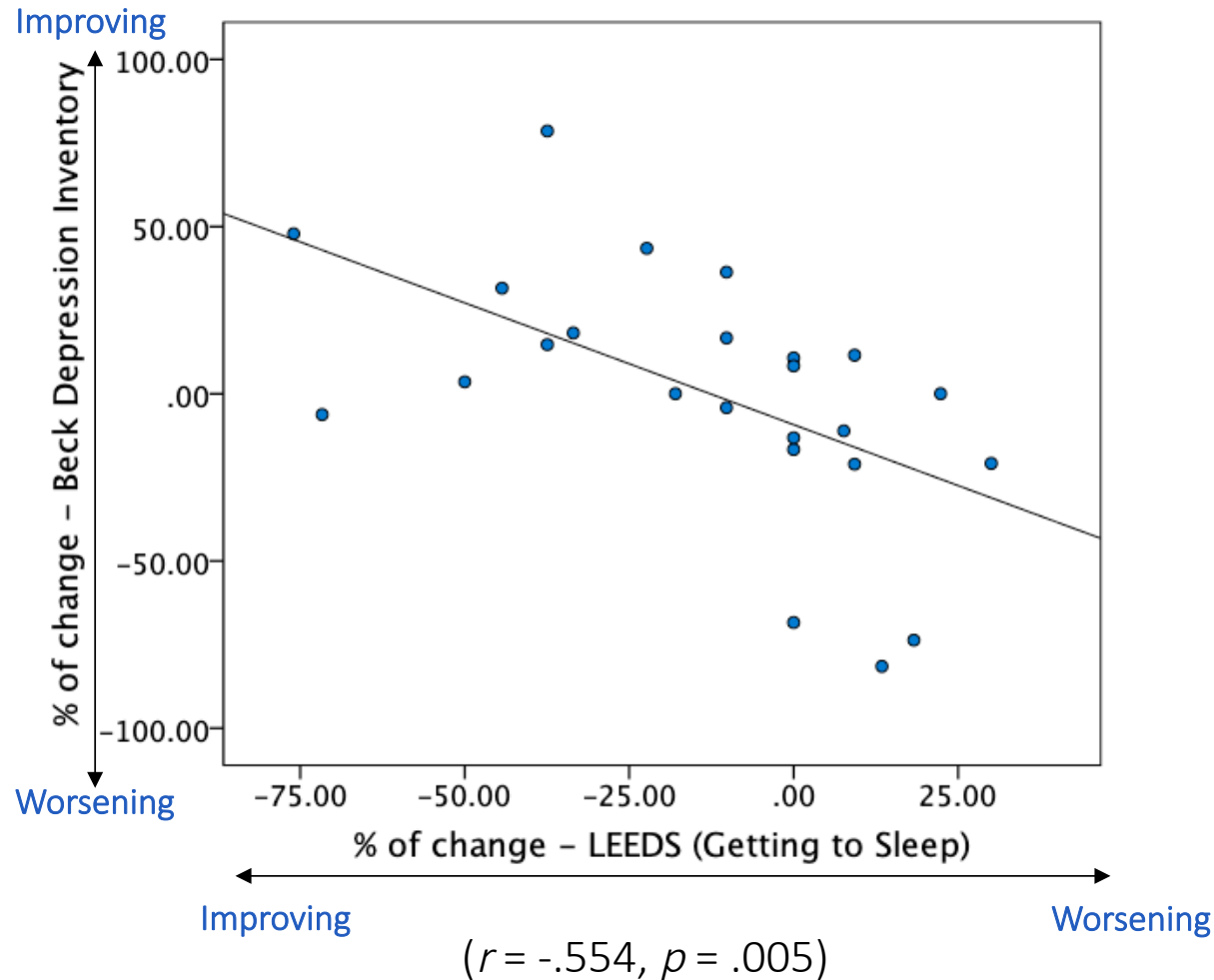
- Correlations between sleep scores at baseline (Week 0) and % of changes in depressive symptoms from baseline (Week 0) to follow-up (Week 4)
  - Whole Intervention;  $(\text{Week 0} - \text{Week 4}) / \text{Week 0} * 100$

# Beck Depression Inventory



A) An increase in mood did occur following light therapy

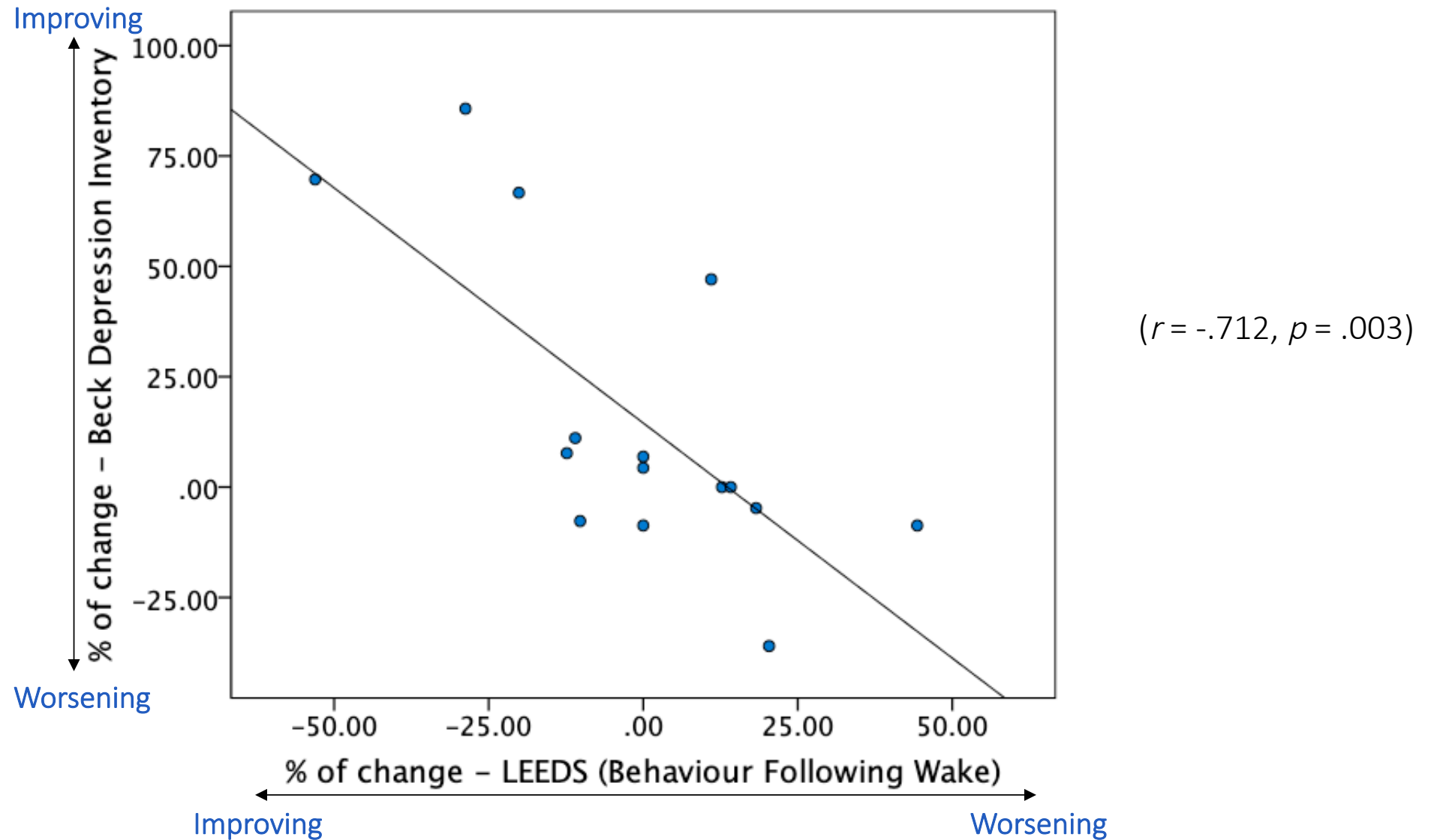
## Relative Change – Early Intervention (first two weeks of treatment)



B) Improvements in depressive symptoms did correlate with improvements in sleep initiation and pre-sleep thoughts

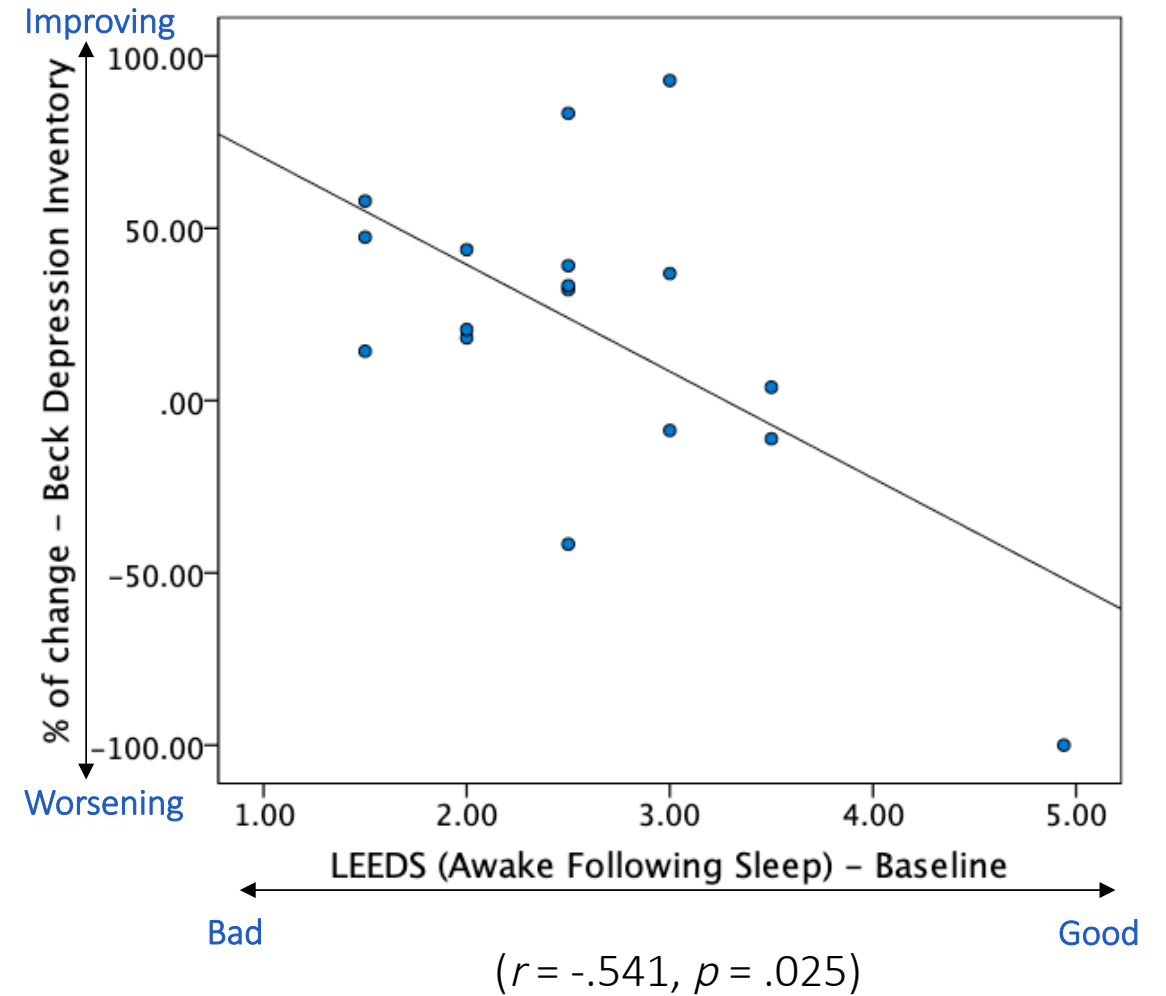
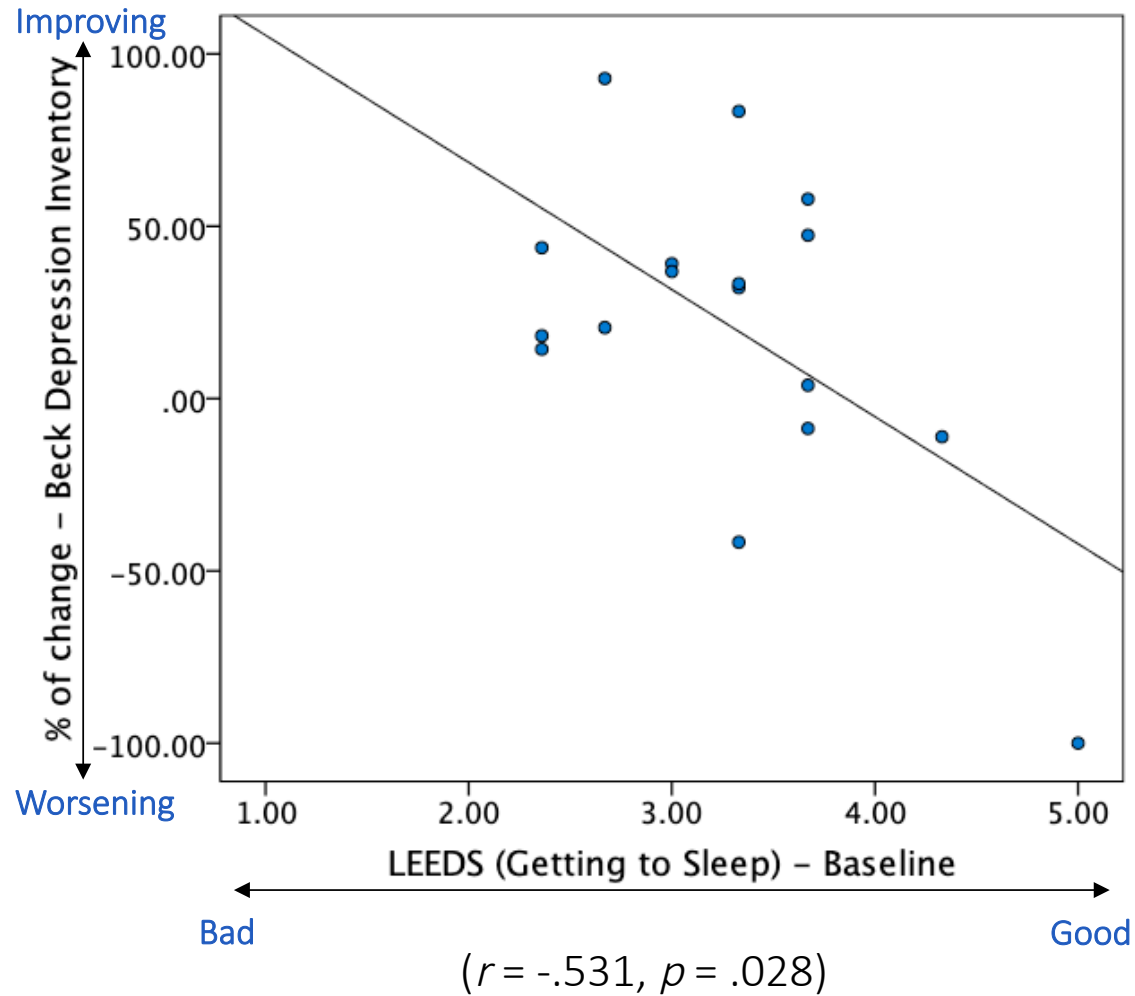


## Relative Change – Later Intervention (last two weeks of treatment)



B) Improvements in depressive symptoms did correlate with improvements in daytime functioning

## Pre-Treatment Sleep Predictors – Whole Treatment



C) Those with poorer sleep prior to light therapy did have a greater reduction in depressive symptoms

## Contributions



- A) Change in mood and sleep from pre- to post-treatment
  - Significant improvements in mood start appearing after 4 weeks of treatment
- B) Potential mechanisms explaining the antidepressant effects of light therapy
  - Early intervention (**first 2 weeks**): improvements in mood correlate with an ease to fall asleep and reductions in unhelpful thoughts at pre-sleep
  - Later intervention (**last 2 weeks**): improvements in mood correlate with a reduction in daytime symptoms of sleep disruptions
- C) Treatment response profile
  - Whole treatment (**all 4 weeks**): better mood was found in those with initially more difficulties falling asleep and staying asleep

# Light Therapy Research Program Overview

## Phase I: Open Label Study (Completed)

- Both researchers and participants know what treatment is being administered

## Phase II : Randomized Control Trial (In Progress)

- Participants are randomly assigned to an experimental or control group
- fMRI; Genetics; Circadian Measures



Thank you!



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