

# Care report: Transcranial, Near-infrared Photobiomodulation to Improve Cognition in Retired Professional Football Player, Possibly Developing CTE

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# PATIENT

- Retired NFL Player, Age 57
- College degree
- Sports History: High school, college, and Cornerback in NFL 1980's.
- History of Depression, on medication
- Repetitive head injuries, estimated thousands of sub-concussive hits.
- 15 surgeries related to football injuries
- At entry 3 pain medications, including 2 narcotics
- At entry: Scored at least 2 SD below average, on one standardized neuropsychological test.



## TREATMENT THOR LED HELMET

3 times per week

6 weeks

18 treatments

20 mins per treatment

660 nm and 850 nm LED

Total 15 Watts

# DEVICE





# Emotional Outbursts, PTSD

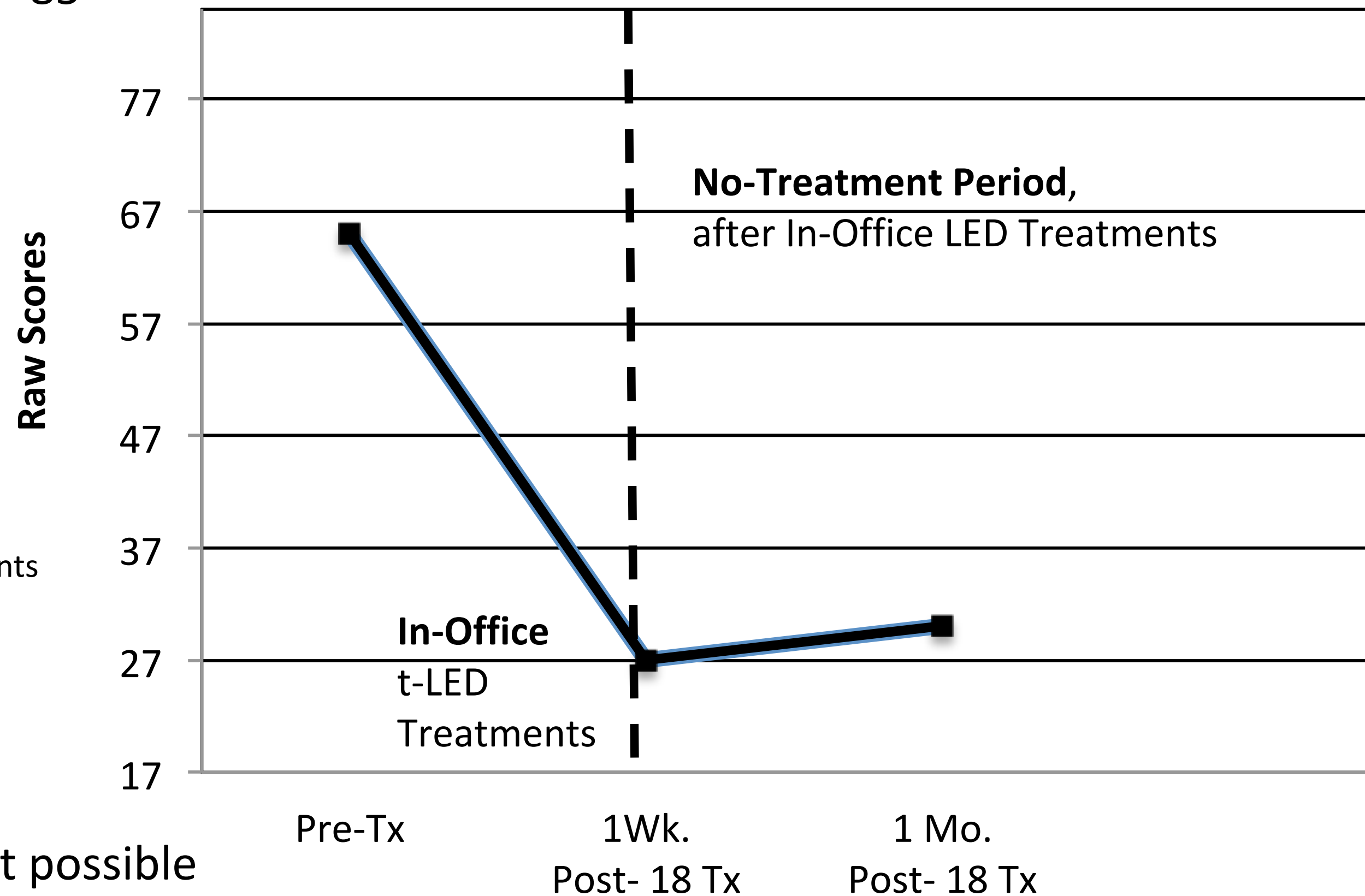
## Post-traumatic Stress Disorder Checklist – Civilian (PCL-C)

Highest possible score = 85

TREATMENT THOR LED HELMET  
 times per week  
 6 weeks  
 18 treatments  
 20 mins per treatment  
 LED 500 mW array  
 22.2 mW/cm<sup>2</sup>  
 26.6 J/cm<sup>2</sup>

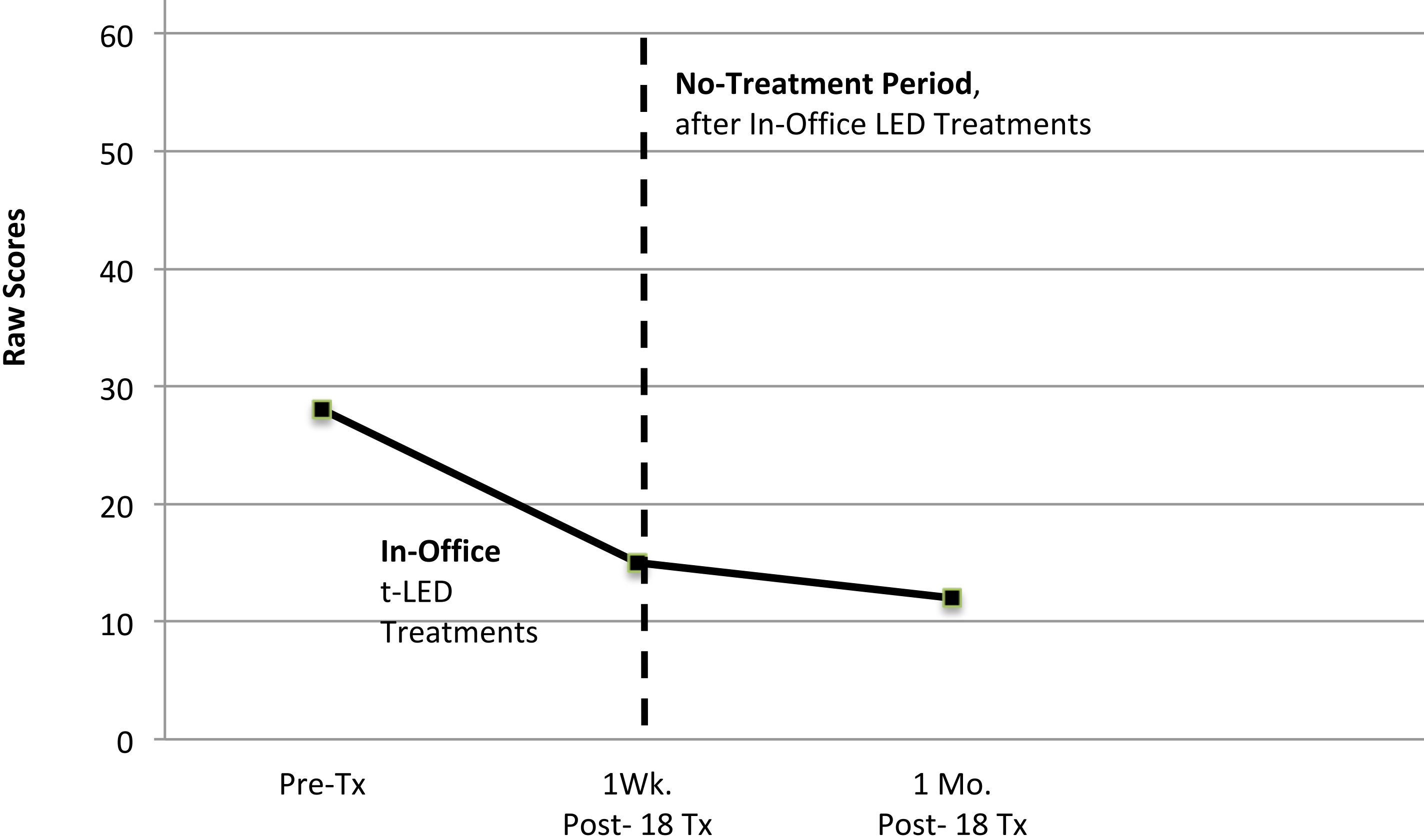
Score > 36 suggests PTSD  
 Reliable decrease = 5-10 points  
 Clinically meaningful decrease = 10-20 points  
 (Monson et al., 2008)

Lowest possible score = 17

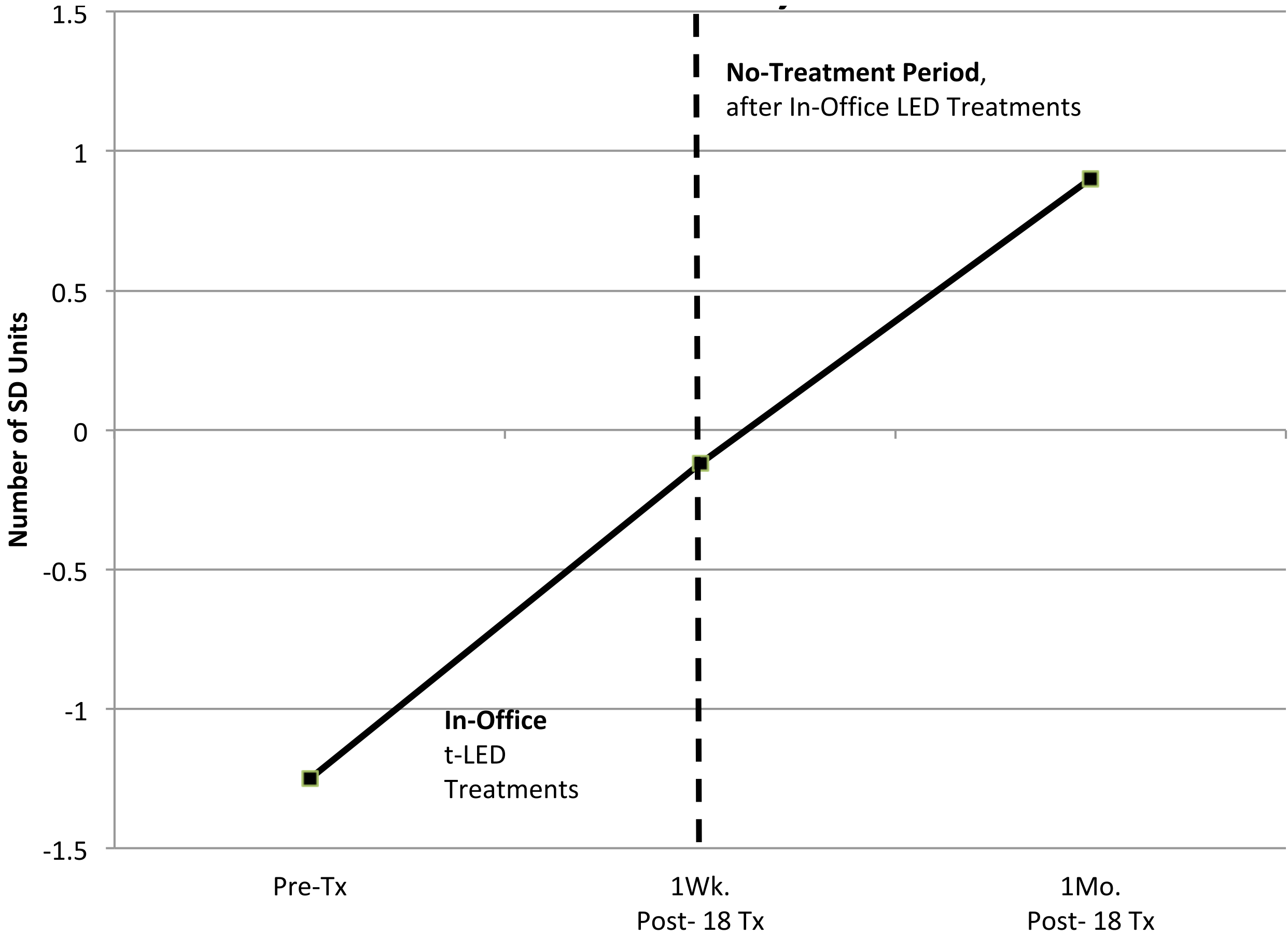


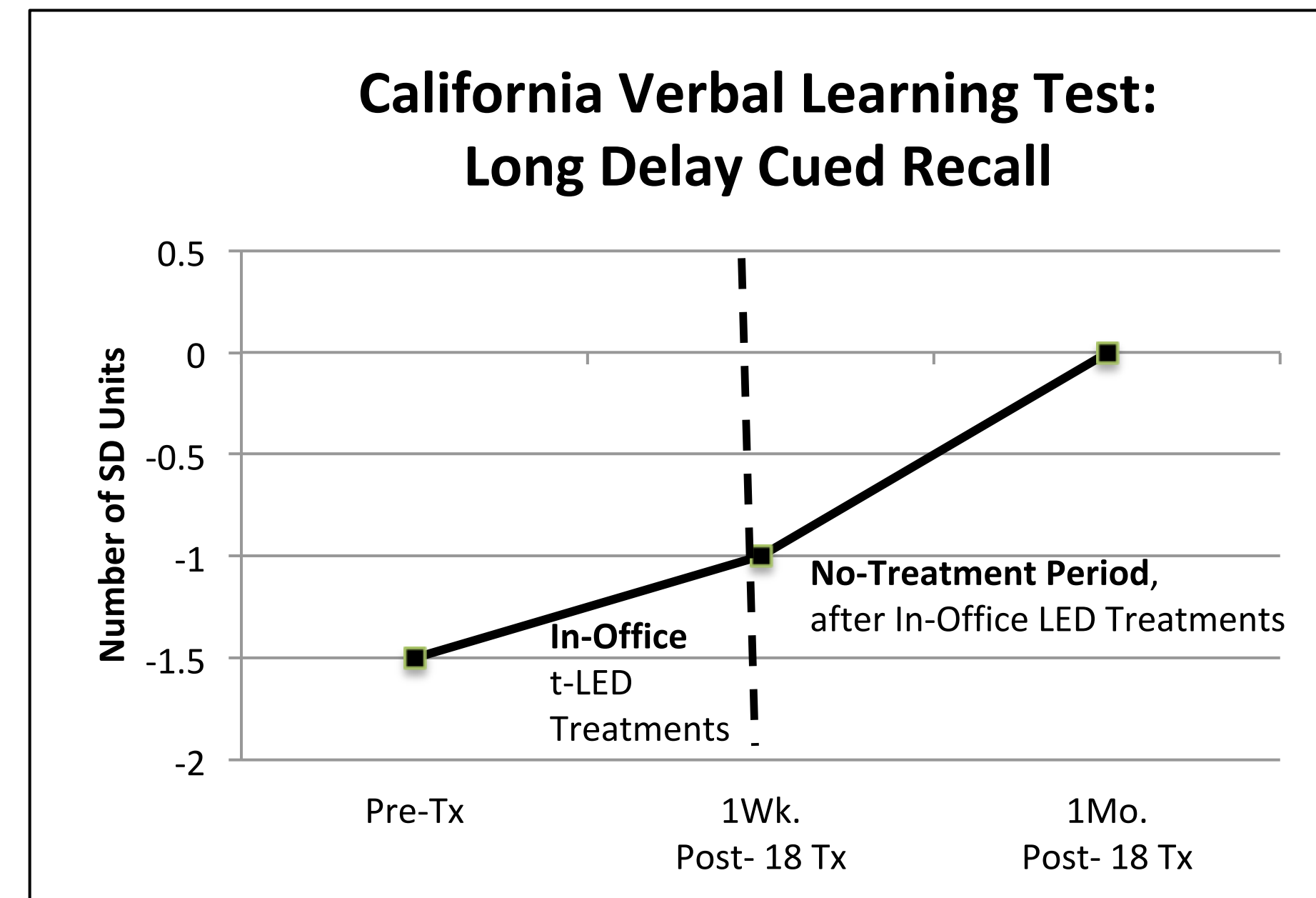
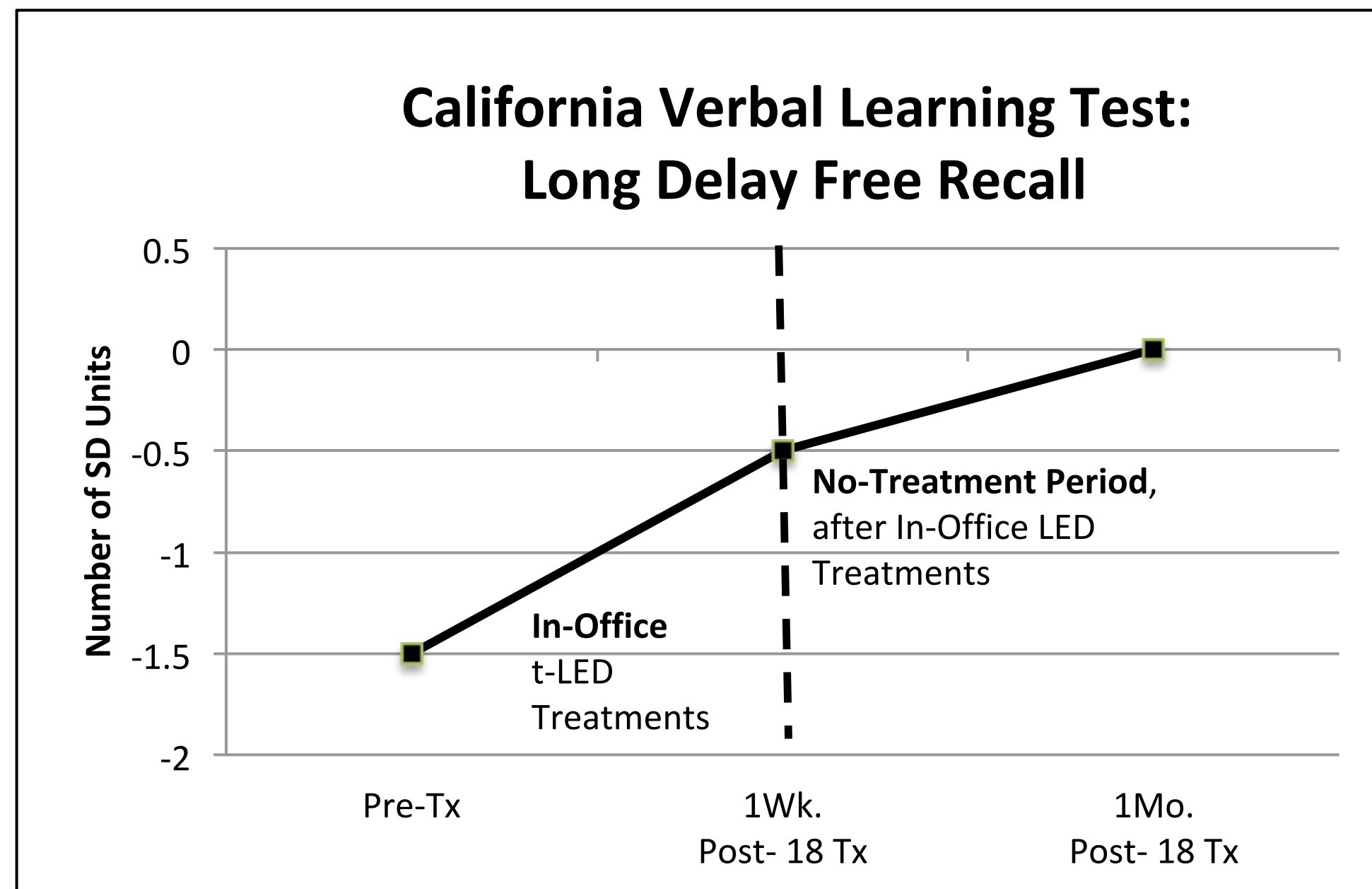
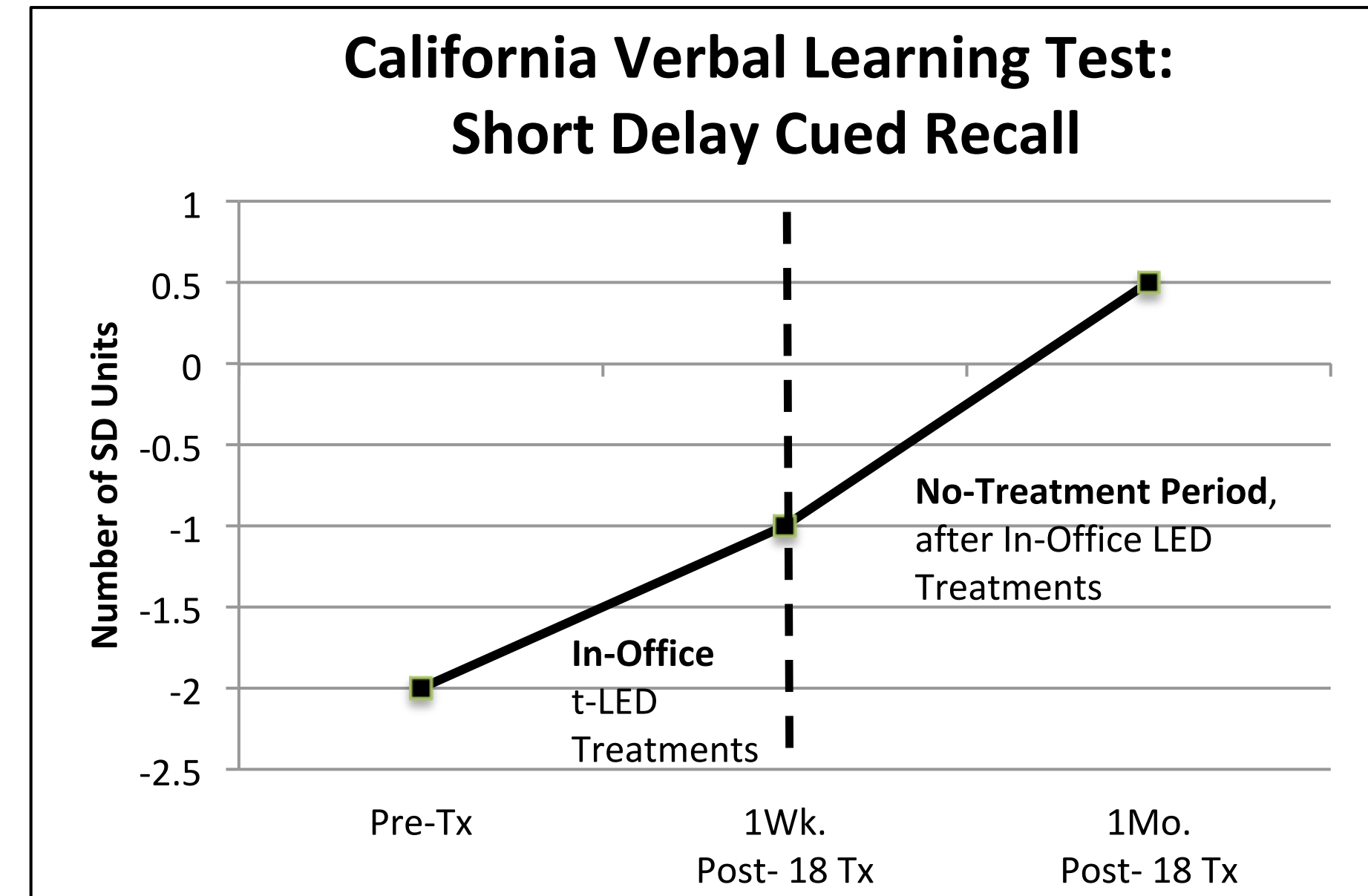
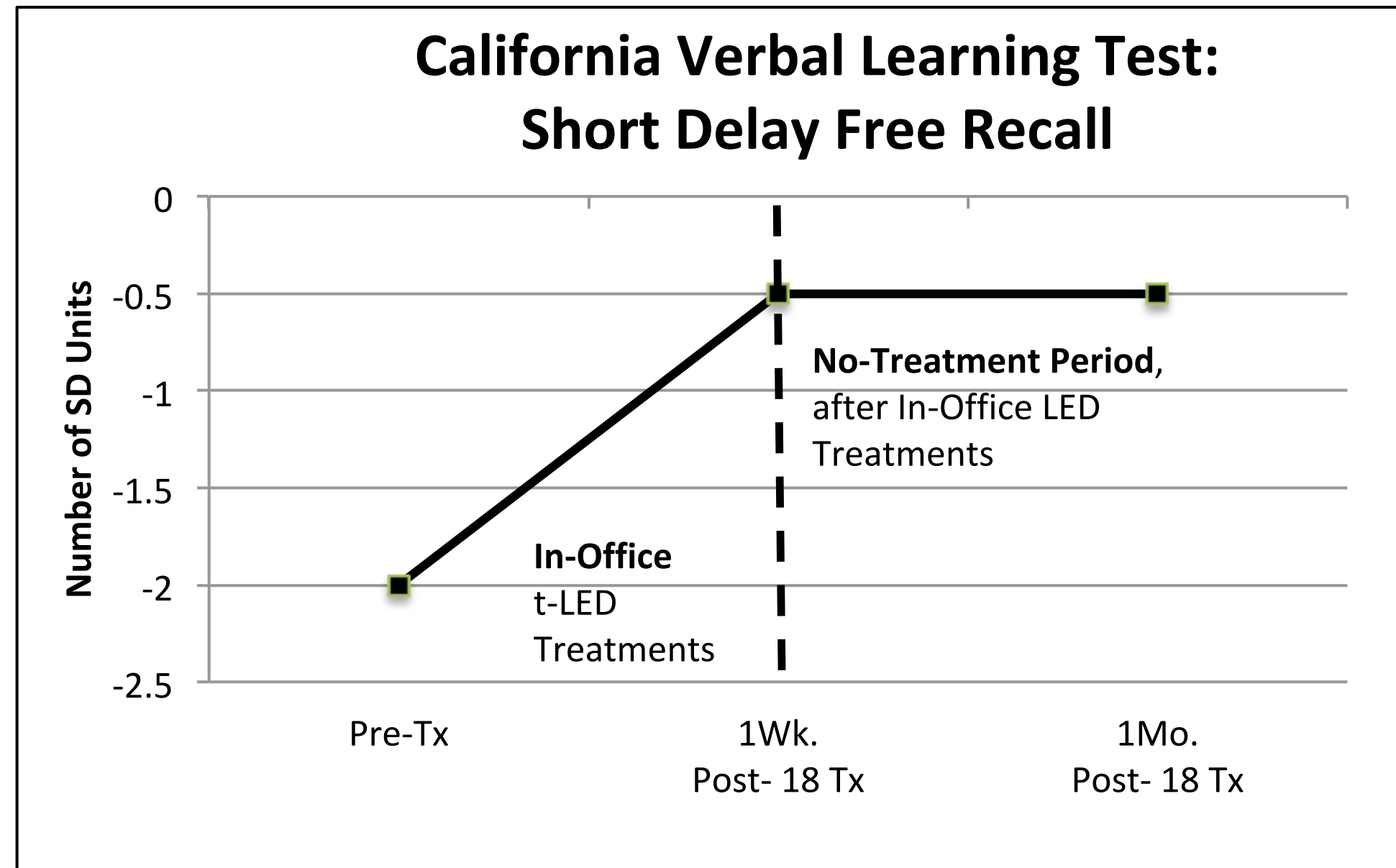
# Beck Depression Inventory – II

## Lower Scores = Less Depression

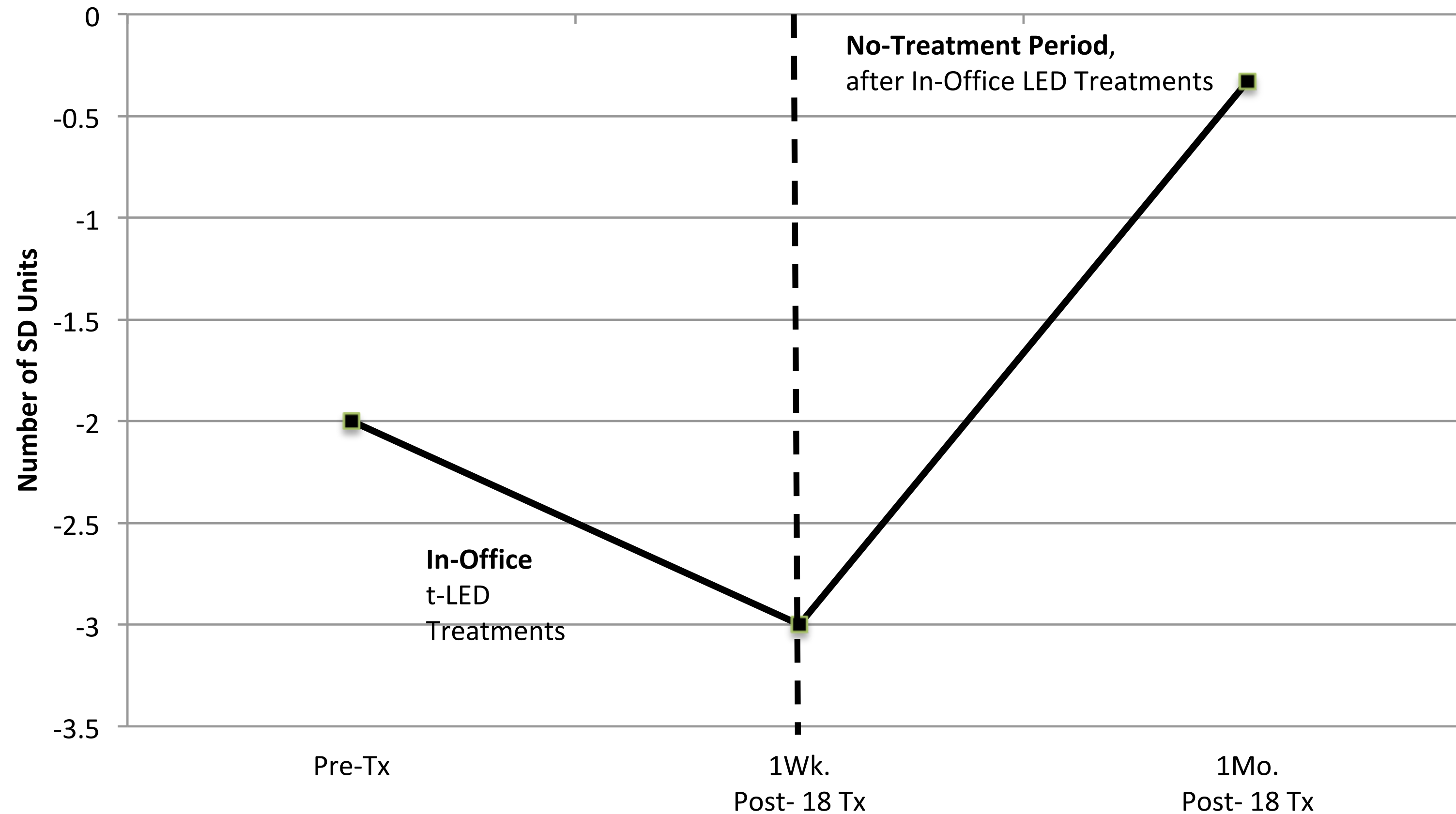


# California Verbal Learning Test: Total Trials, 1-5





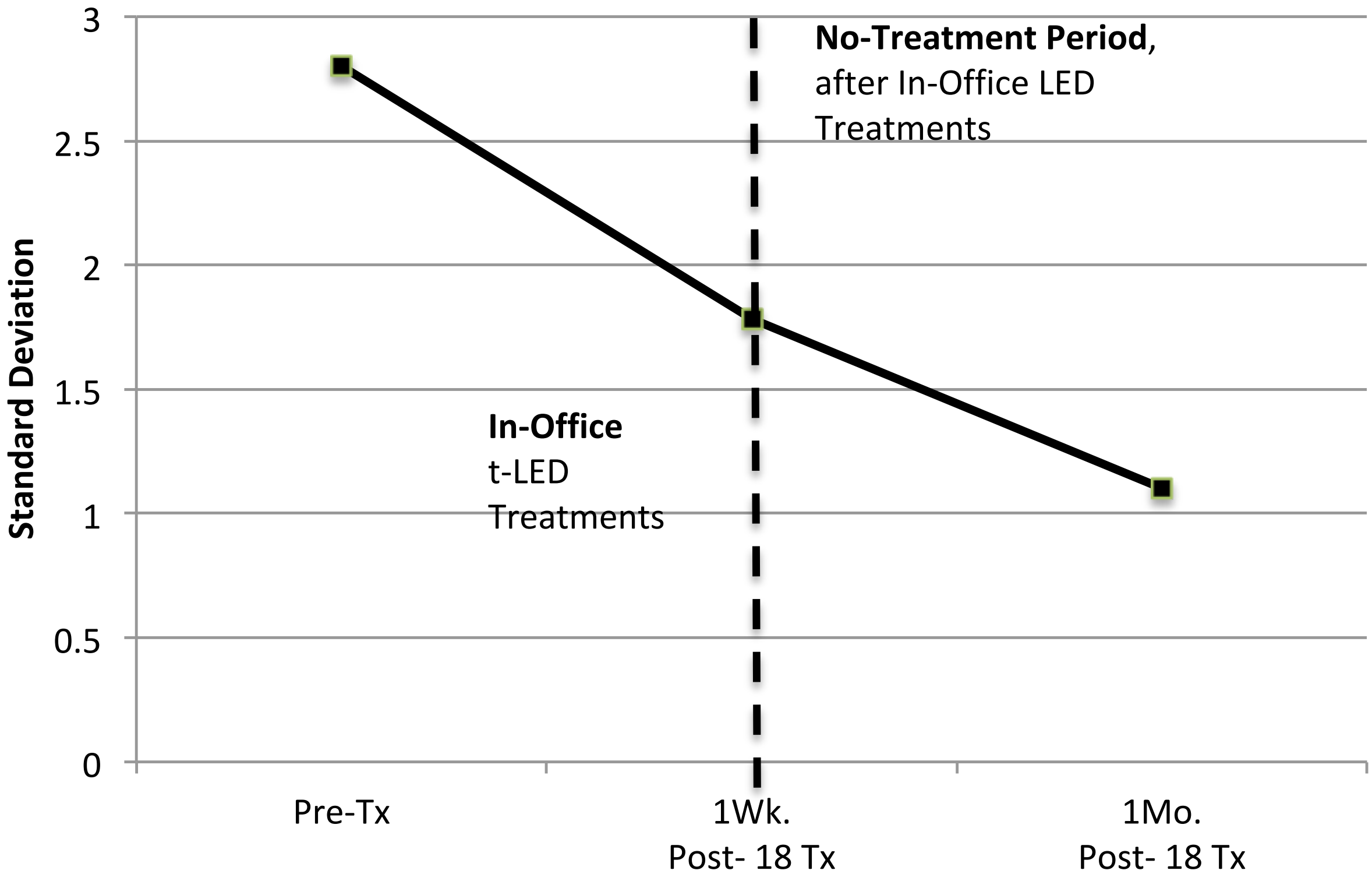
# Stroop Test for Executive Function: Trial 3, Inhibition





**Continuous Performance Test – AX Version**  
**Press the spacebar on keyboard, when an “X” appears**  
***Measures Attention***

**d' (Prime)**

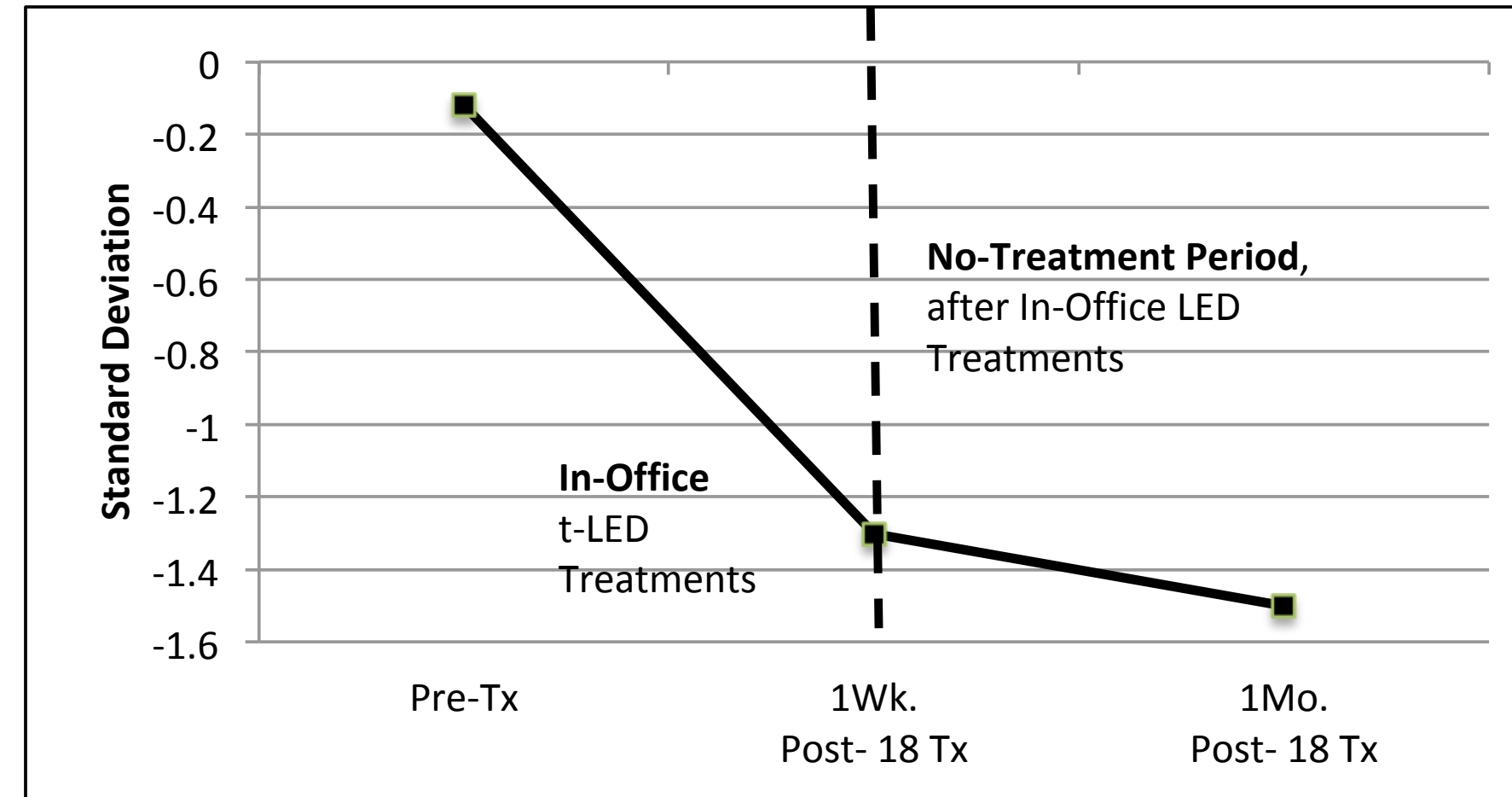


Lower values indicate improvement in attention

The value d' is a measure of the difference between the signal (non-X) and noise (X) distributions. As such, d' provides a means for assessing an individual's **discriminative power** since, in general, the greater the difference between the signal and noise distributions, the better the ability to distinguish and detect X and non-X stimuli.

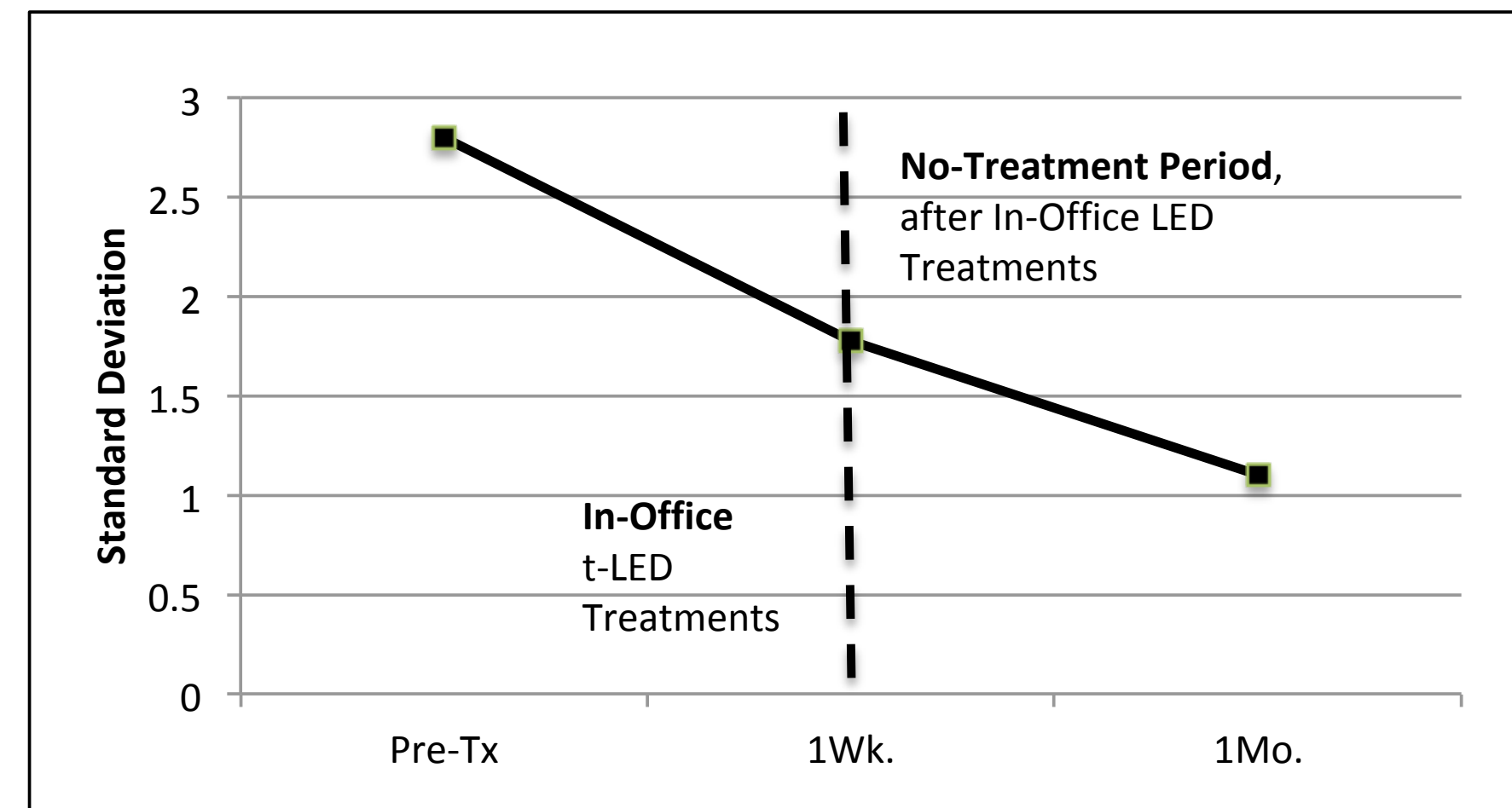
# Continuous Performance Test – AX Version *Measures Attention*

## Percent False Alarm Rate



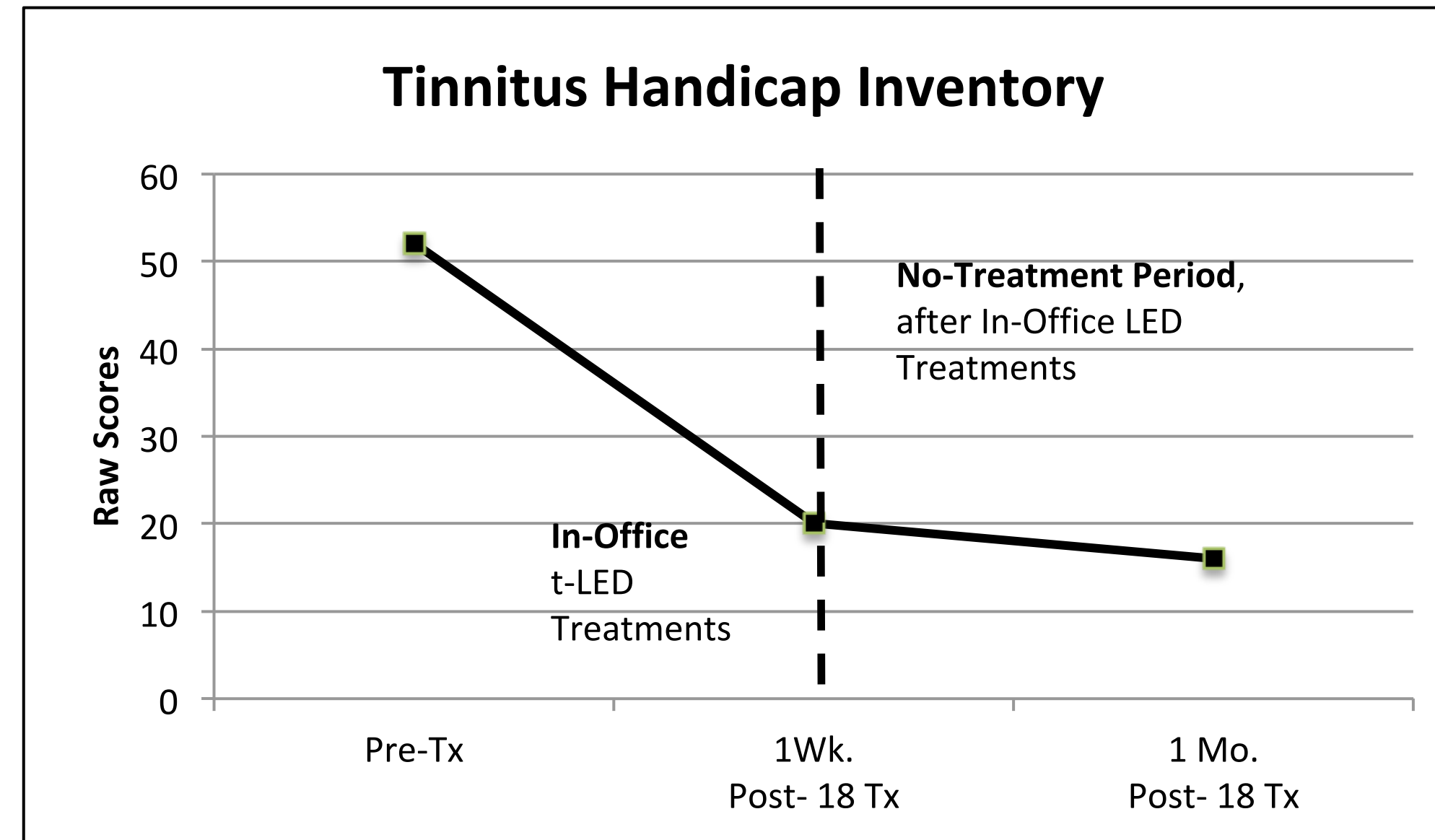
# Continuous Performance Test – AX Version *Measures Attention*

## Reaction Time



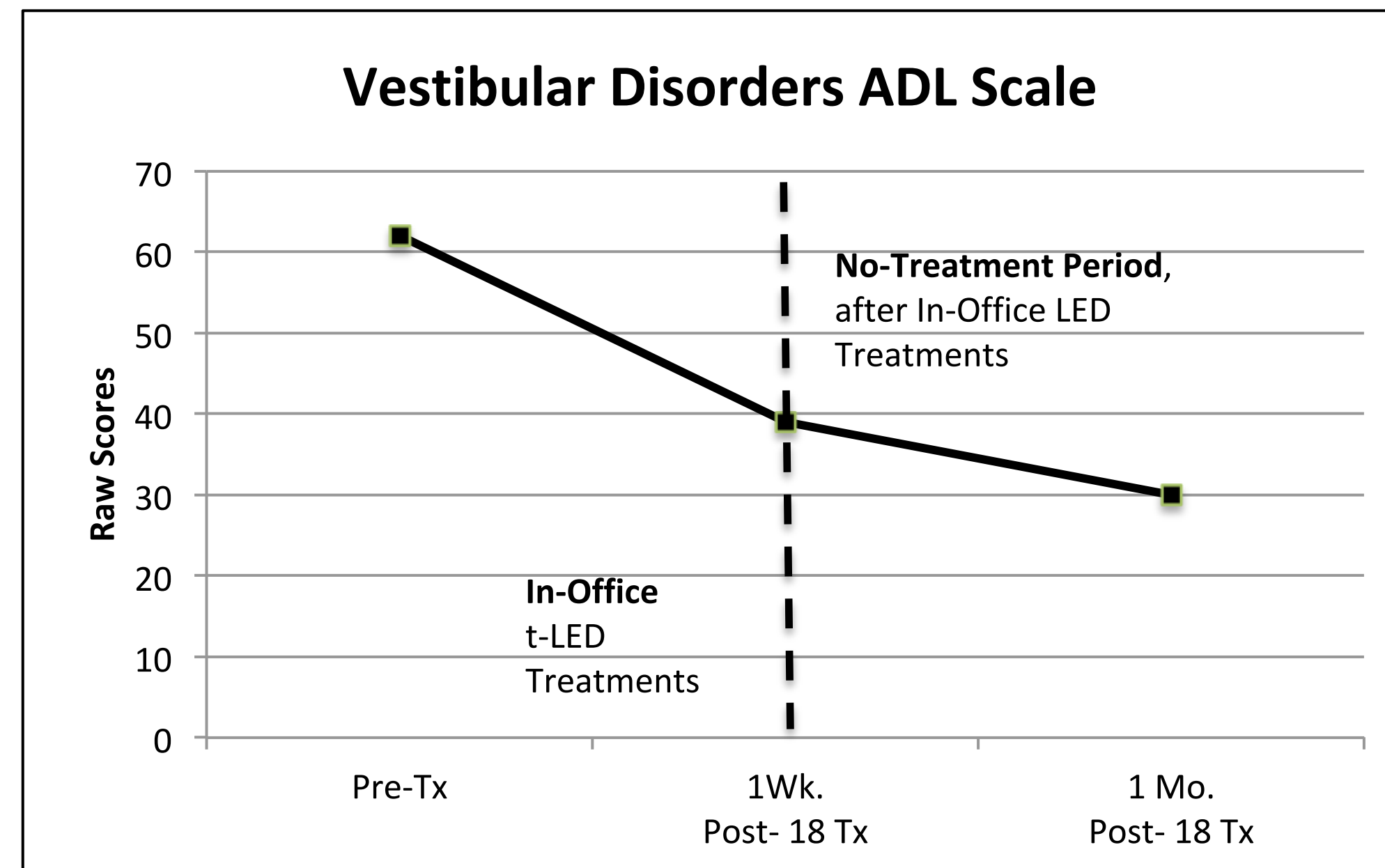
Maximum score = 100

Minimum score = 0

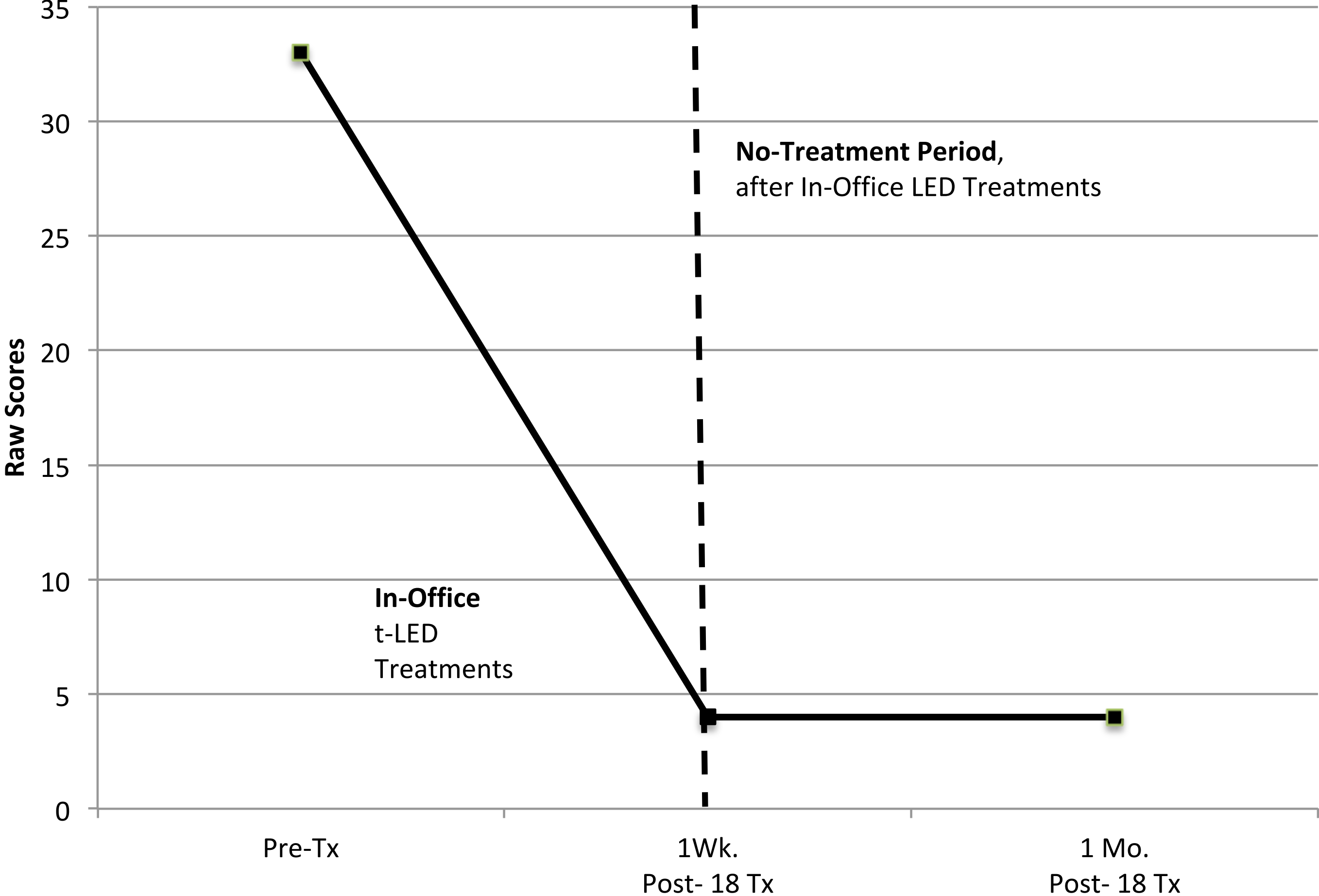


Maximum score = 280

Minimum score = 0



# Dysexecutive Questionnaire (DEX) Self-Rating of Cognitive, Behavioral and Emotional Difficulties



# Short Form McGill Pain Questionnaire

## Lower Scores = Less Pain

“He was able to get completely off his two narcotic medications at the end of the study

This was a bit of a surprise to us, that his pain was so greatly reduced

We only treated the head, we never touched his right shoulder (pain area) with any of the LEDs.

There is a paper published on the role of the Default Mode Network in many conditions, including chronic pain, and even opioid addiction (Garland et al., 2013 - attached).

I am guessing the LEDs reorganized the Default Mode Network in his case”

