



# ADHD traits and psychomotor vigilance after 5 nights of experimental sleep restriction in early adolescents: preliminary results

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## INTRODUCTION

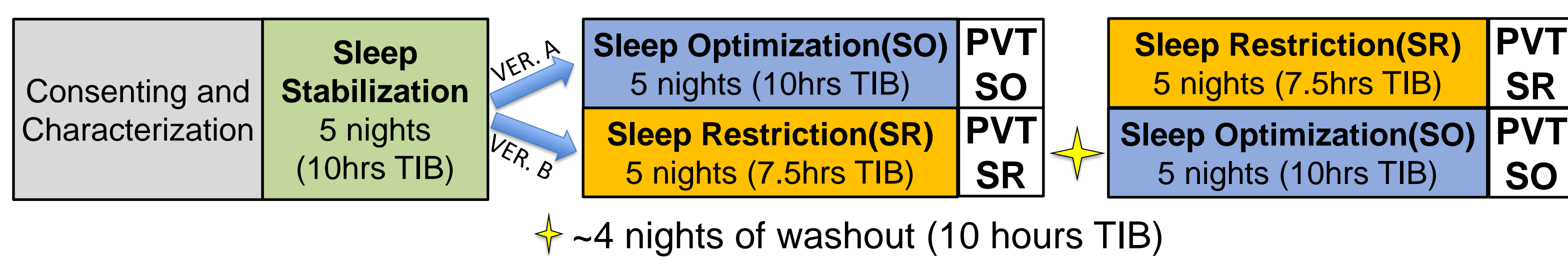
Insufficient sleep is prevalent in adolescents, particularly those with ADHD.<sup>1,2</sup> In adolescents, sleep restriction impairs vigilant attention in a dose-dependent and cumulative manner.<sup>3</sup>

In adults, interindividual differences determine how sleep restriction impairs attention.<sup>4</sup> It remains unclear which factors contribute to vulnerability in children.

**AIM: Investigate how at home sleep restriction impacts vigilant attention in children and determine phenotypic traits that underlie vulnerability to these impacts.**

## STUDY PROCEDURES

### PROTOCOL



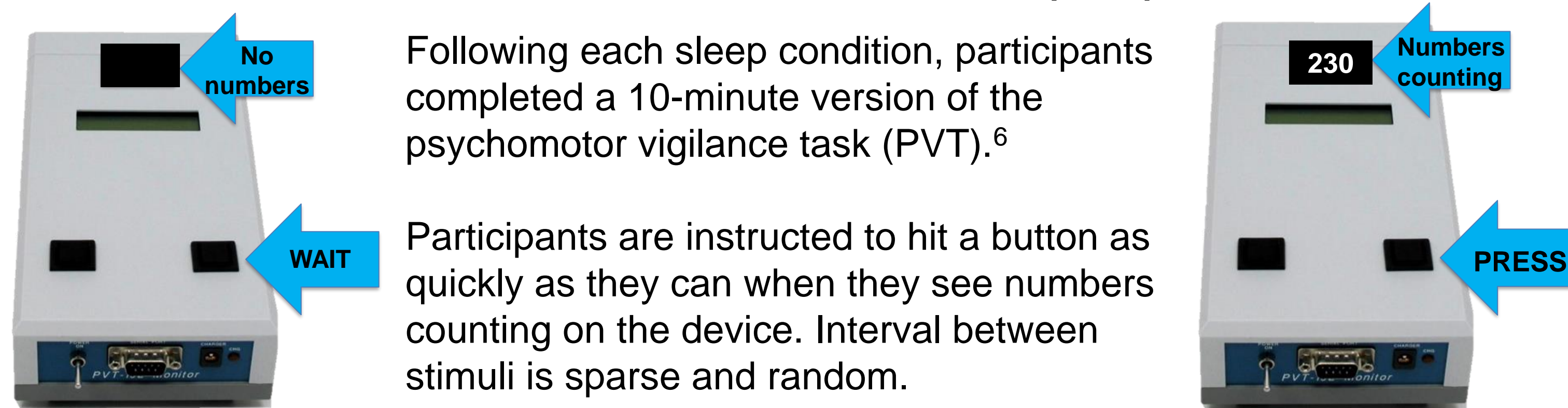
Children were characterized on attention and hyperactivity through Conner's parent forms.

Following stabilization [5 nights 10 hours time in bed (TIB)] participants entered a crossover protocol:

- **Sleep optimization(SO):** 5 nights: 10 hours TIB set to habitual risetimes
- **Sleep restriction(SR):** 5 nights: 7.5 hours TIB bedtimes delayed and risetimes advanced equally by 1.25 hours from stabilization schedule
- Four nights of washout (10 hours TIB) between restriction & optimization

Sleep was monitored using wrist worn actigraphy, sleep diary, and daily participant call-ins. Actigraphic sleep was scored using the Sadeh algorithm.<sup>5</sup>

### PSYCHOMOTOR VIGILANCE TASK (PVT)



Following each sleep condition, participants completed a 10-minute version of the psychomotor vigilance task (PVT).<sup>6</sup>

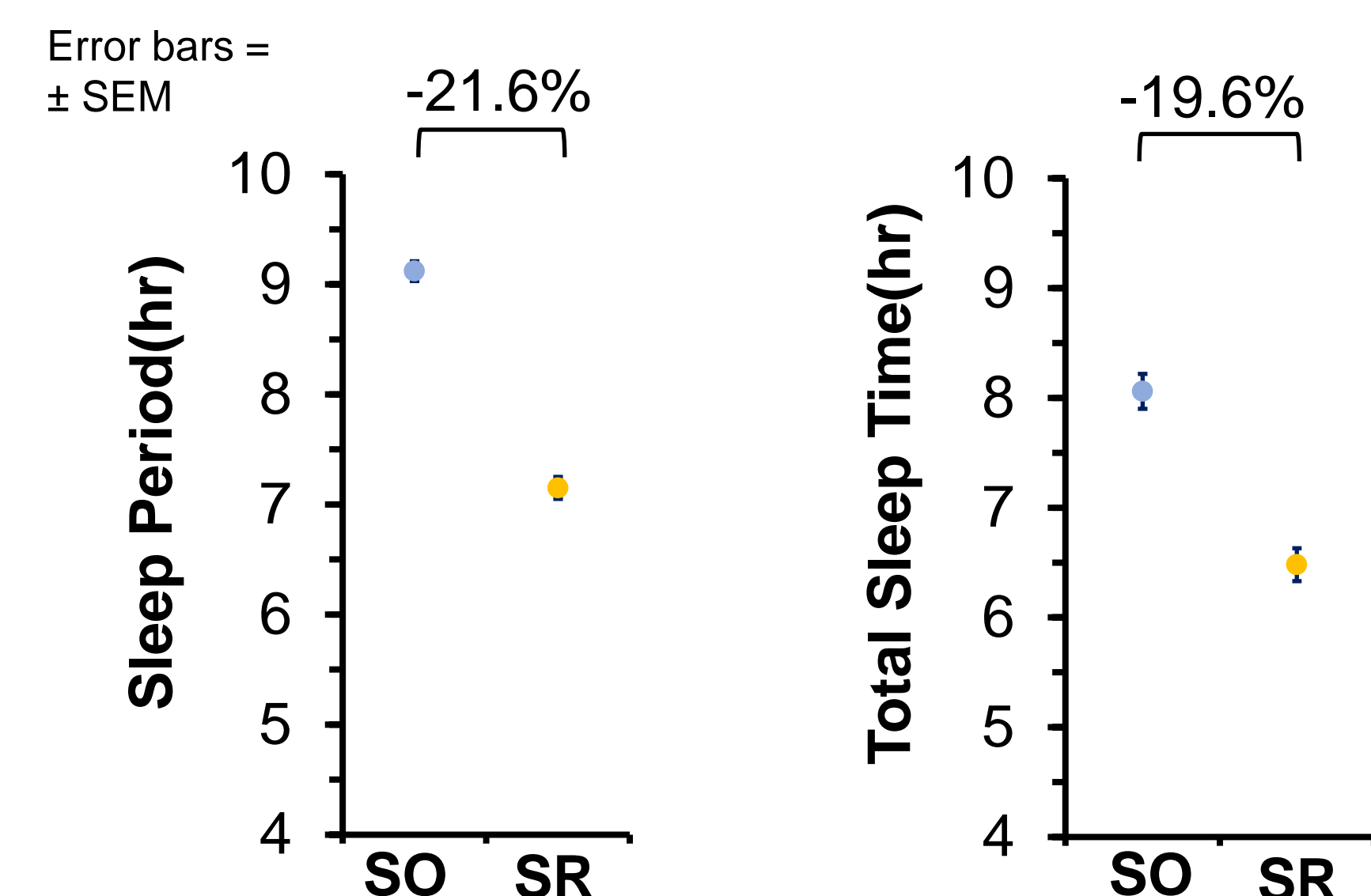
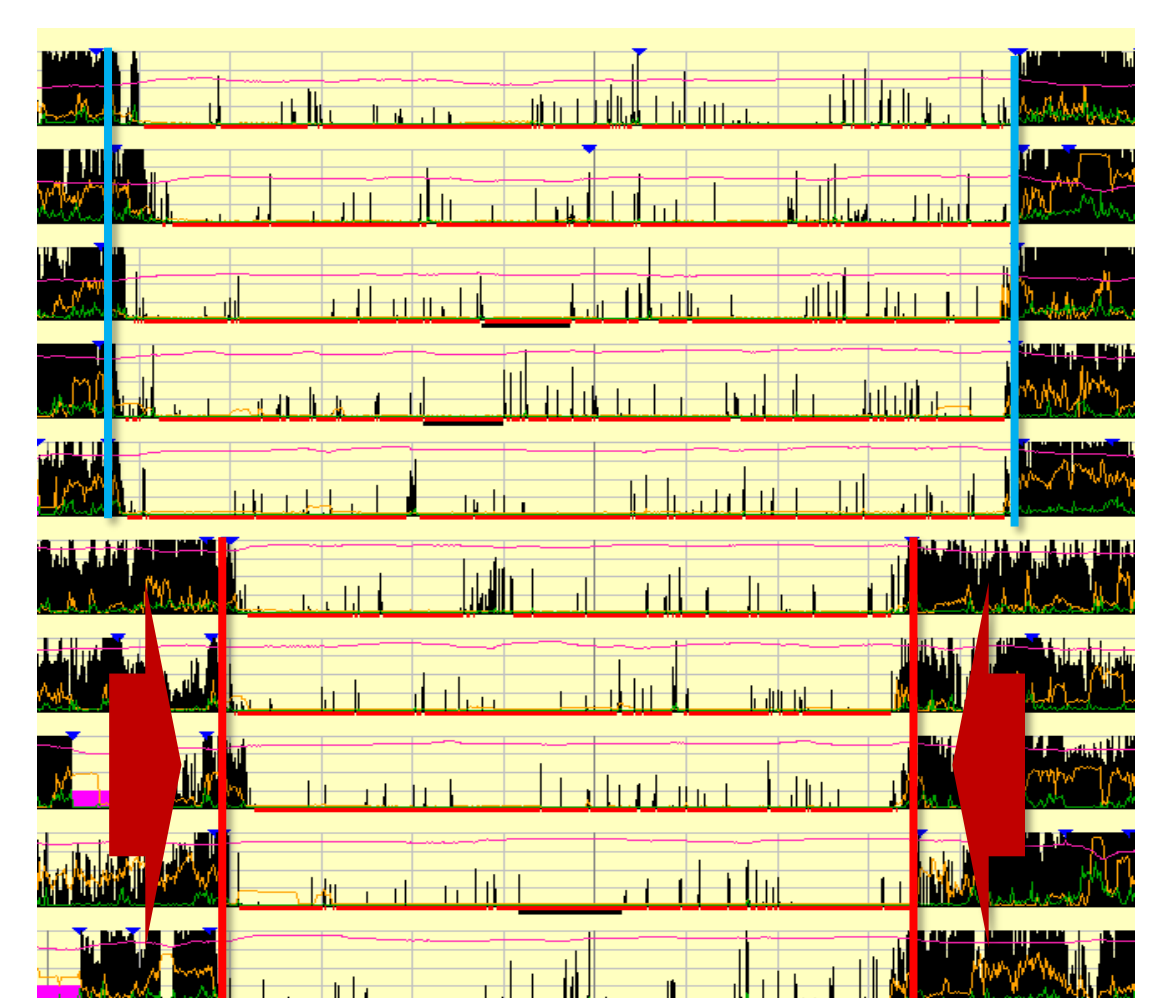
Participants are instructed to hit a button as quickly as they can when they see numbers counting on the device. Interval between stimuli is sparse and random.

### PVT VARIABLES:

- **Lapses:** Number of responses with a reaction time greater than 500ms
- **Reciprocal Reaction Time (RRT):** 1/Reaction time (1/sec)

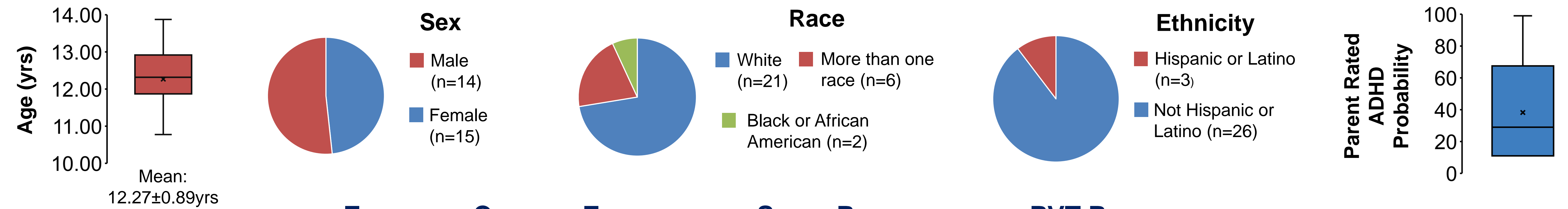
## MANIPULATION CHECK OF AT HOME SLEEP RESTRICTION

### REPRESENTATIVE ACTIGRAM

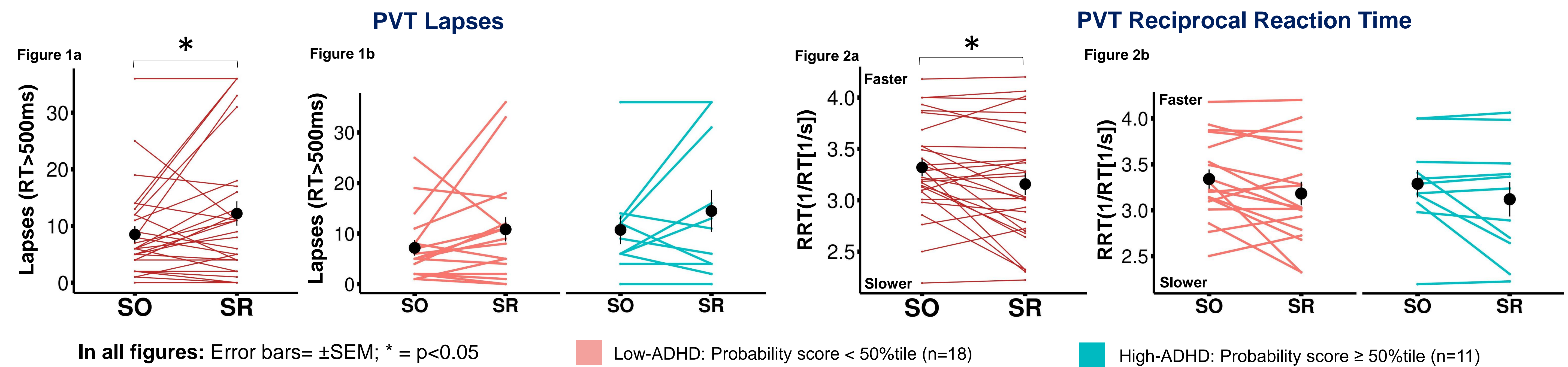


At home sleep restriction decreased sleep period by 21.6% and total sleep time by 19.6%.

## DEMOGRAPHICS N=29



## EFFECT OF CHRONIC EXPERIMENTAL SLEEP RESTRICTION ON PVT PERFORMANCE



In all figures: Error bars= ±SEM; \* = p<0.05

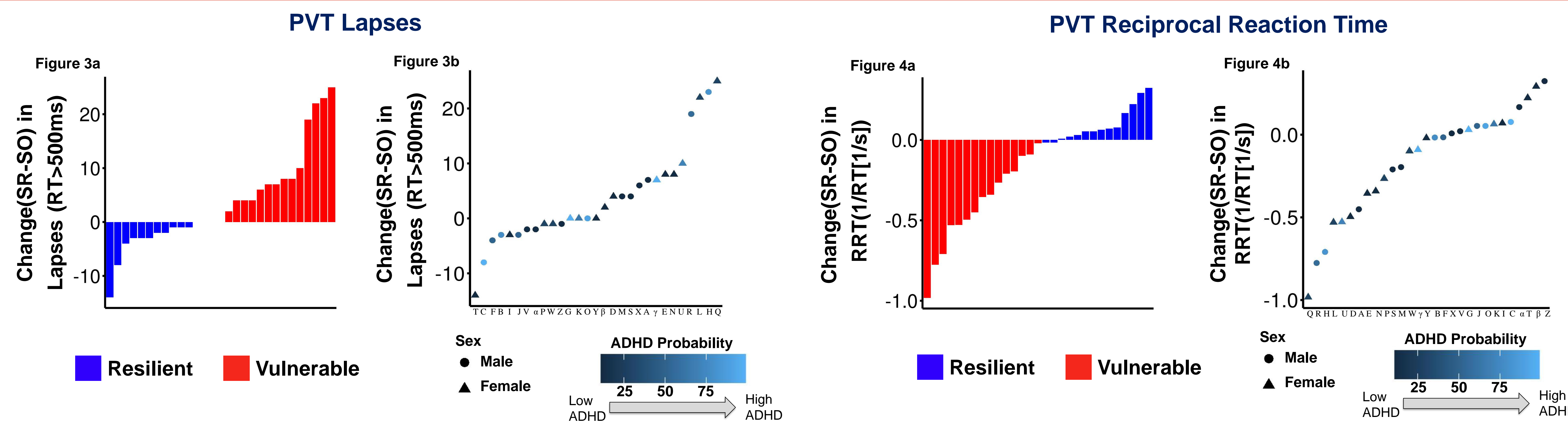
Low-ADHD: Probability score < 50%tile (n=18)

High-ADHD: Probability score ≥ 50%tile (n=11)

Mixed-effects ANOVA evaluating condition (SO vs. SR) and group (low vs. high-ADHD) showed a significant main effect of condition with increased lapses ( $F(1, 27)=4.32, p=.047, \eta^2=.14$ ) and slowed reciprocal reaction time ( $F(1, 27)=6.52, p=.017, \eta^2=.20$ ) after sleep restriction. There was no main effect of group or group-by-condition interaction on PVT lapses or RRT ( $ps>0.05$ ).

**Chronic at home sleep restriction led to significantly more PVT lapses and slower reaction times compared to sleep optimization.**

## CURRENT DIRECTIONS: EXPLORING PHENOTYPIC VULNERABILITY



In Figure 3a & 4a, a median split of change (SR-SO) in PVT performance was used to classify individuals as vulnerable or resilient. In Figures 3b & 4b, individuals are identified by a unique letter, colored by parent-rated ADHD probability and the shape is determined by sex. Our goal is to use phenotypic variables to predict an individual's membership in vulnerable or resilient groups. Other phenotypic variables including inattentive and hyperactive symptoms, baseline performance on cognitive assessments, age, pubertal status, phase preference and biological markers of circadian timing will be evaluated.

## REFERENCES

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