

Assessment of Sleep Parameters in Adults with Persistent Post-concussive Symptoms



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Background

- Persistent post-concussive symptoms (PPCS) affect up to 30% of individuals following mild traumatic brain injury (mTBI)¹.
- Sleep is a common PPCS, with up to 50% of individuals reporting sleep difficulties following traumatic brain injury².
- Sleep disturbance has been associated with severity of PPCS, which may lead to additional functional impairment³.
- Few studies have characterized sleep parameters in adults with PPCS following mTBI using both objective and subjective measures of sleep.

Objectives

- 1) Characterize sleep parameters (sleep duration, onset latency, efficiency) using wrist-worn actigraphy in adults with PPCS compared to age and sex-matched healthy controls.
- 2) Evaluate associations between sleep parameters and other post-concussive symptoms.

Methods

Design: cohort study nested within a randomized controlled trial

Recruitment: 82 participants (n=41 PPCS, n=41 controls)

- recruitment is ongoing (n=38 recruited thus far)

Inclusion:

PPCS group -

- a) mTBI (American Congress of Rehabilitation Medicine criteria)
- b) PCS (ICD-10 criteria) ≥3 months & ≤5 years
- c) ≥18 & ≤65 years old
- d) stable pharmacological regimen

Healthy controls -

- a) age (within 3yrs) & sex-matched to participants with PPCS
- b) no history of sleep disorder
- c) no history of traumatic brain injury
- d) no psychiatric history

Sleep Outcomes

- 3-6 days/nights of wrist-worn actigraphy (MotionWatch [CamNTEch]) & sleep diary
- Epworth Sleepiness Scale (ESS)

Symptom Questionnaires

- Rivermead Post Concussion Symptoms Questionnaire (RPQ)
- Headache Impact Test (HIT-6)
- Fatigue Severity Scale (FSS)
- Patient Health Questionnaire (PHQ-9)
- Generalized Anxiety Disorder Scale (GAD-7)

Statistical Analysis

- Between group comparison of sleep parameters using independent samples t-tests
- Associations between sleep measures (latency, efficiency and duration) and ESS analyzed using Spearman's rank correlations



Preliminary Results

	PPCS (n=19)	Controls (n=19)	p Value
Demographics, Injury Characteristics, Symptom Burden & Fatigue			
Age at assessment, M (SD)	43.3 (10.7)	43.6 (11.2)	0.930
Sex, n (% female)	15 (79.0)	15 (79.0)	
Months since injury, M (SD)	19.2 (11.9)		
≥2 total mTBI, n (%)	15 (79.0)	0 (0.0)	
Rivermead Post Concussion Symptoms Questionnaire [0-64], M (SD)	37.6 (10.4)		
Fatigue Severity Scale [9-63], M (SD)	45.0 (14.3)	20.4 (8.6)	<0.001*

* p<0.05

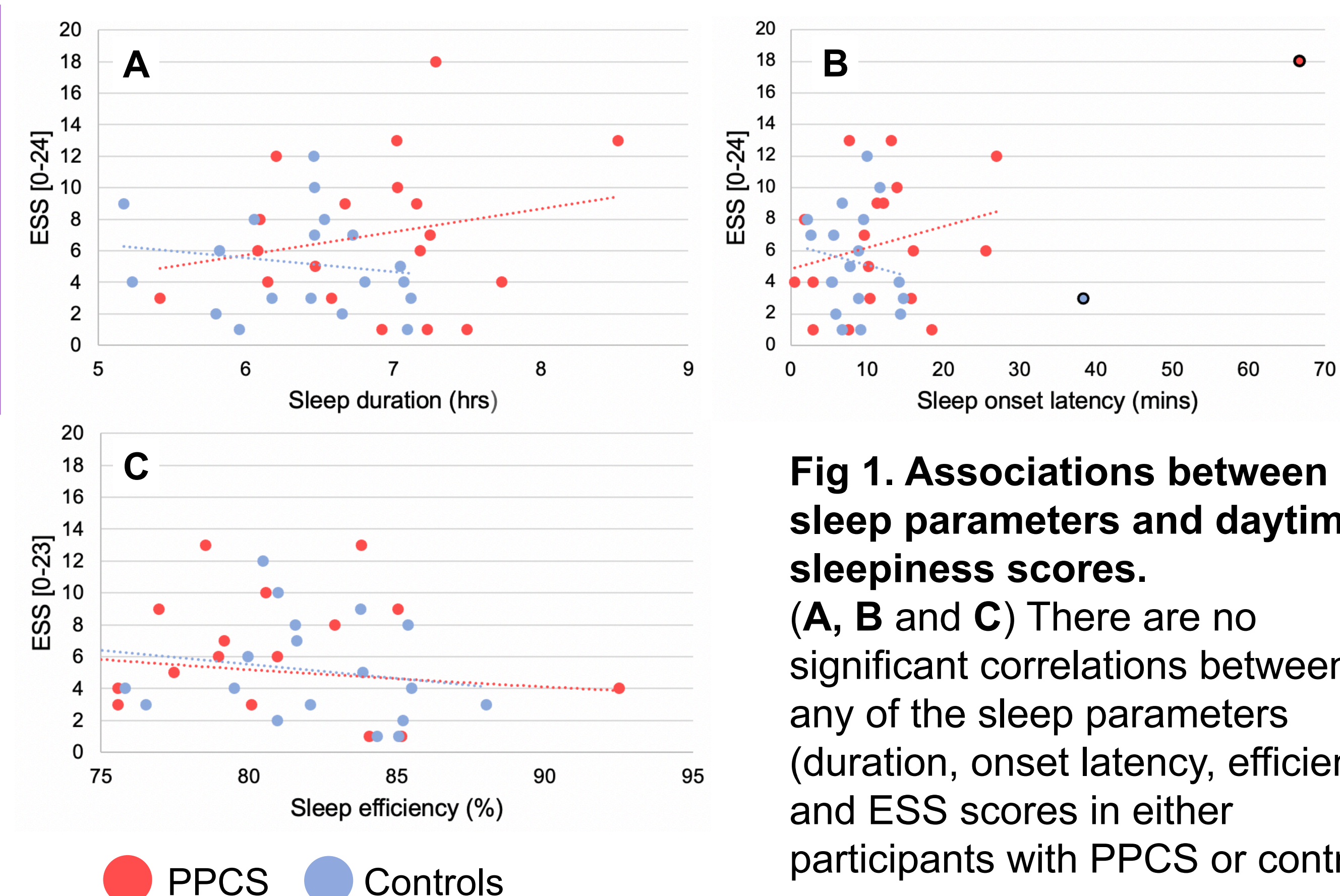


Fig 1. Associations between sleep parameters and daytime sleepiness scores. (A, B and C) There are no significant correlations between any of the sleep parameters (duration, onset latency, efficiency) and ESS scores in either participants with PPCS or controls.

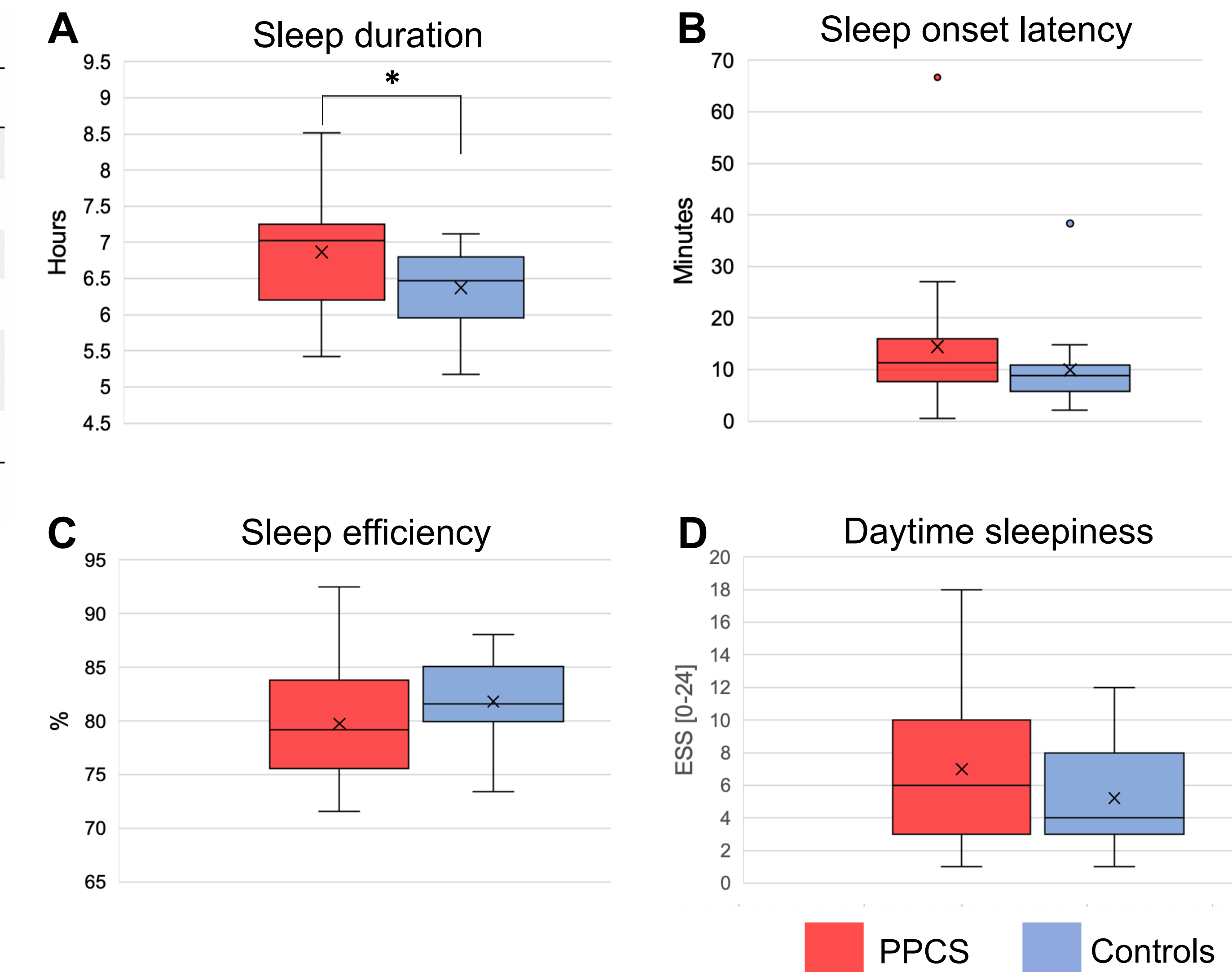


Fig 2. Between group comparison of subjective & objective sleep measures. (A) Sleep duration was significantly longer in participants with PPCS than controls (PPCS 6.9hrs±0.7, controls 6.4hrs±0.6, p=0.025). (B) Sleep latency was longer (non-significant) in participants with PPCS. (C) Sleep efficiency was lower (non-significant) in participants with PPCS. (D) Daytime sleepiness (Epworth Sleepiness Scale) scores were higher (non-significant) in participants with PPCS.

Discussion & Future Directions

- Preliminary results suggest participants with PPCS have significantly higher fatigue scores and longer sleep duration than healthy controls.
- The Epworth Sleepiness Scale (ESS), a commonly used subjective measure of sleep in mTBI, is not correlated with any objective actigraphy parameters in participants with PPCS or controls.
- Data collection is ongoing and should be completed by the end of 2021.



References

1. Sigurdardottir et al. *Brain Injury*. 2009.
2. Mathias et al. *Sleep Med*. 2012.
3. Theadom et al. *Sleep Med*. 2015.

Acknowledgments



Integrated Concussion Research Program



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