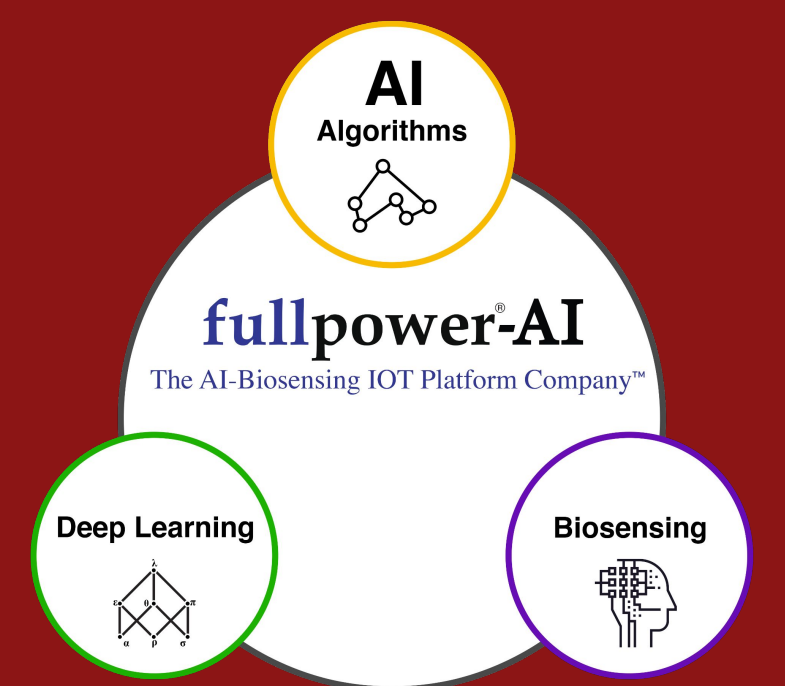




# Evaluation of Sleep-Related Respiratory Events in a Continuous Large U.S. Sample by Home-Based Under-Mattress Monitoring Devices



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## Introduction

Population studies have estimated the prevalence of sleep-related respiratory events characteristic of obstructive sleep apnea (OSA) and reported night-to-night variability in OSA severity, but these have been constrained by the inability to obtain continuous nightly data on a large scale. The current study is the largest to date for the evaluation of the prevalence and night-to-night variability of these events.

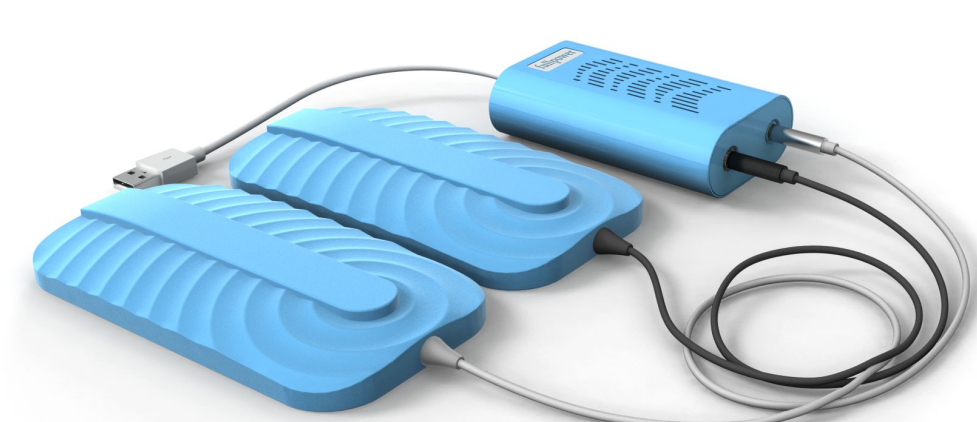
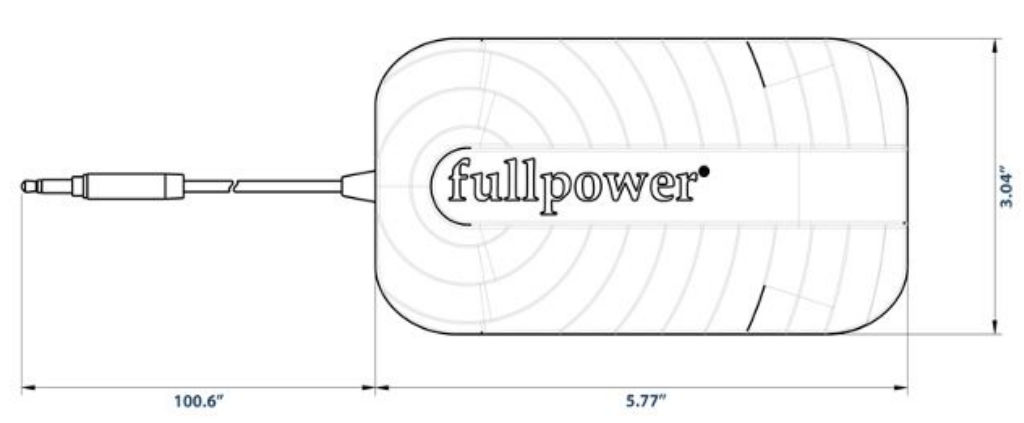
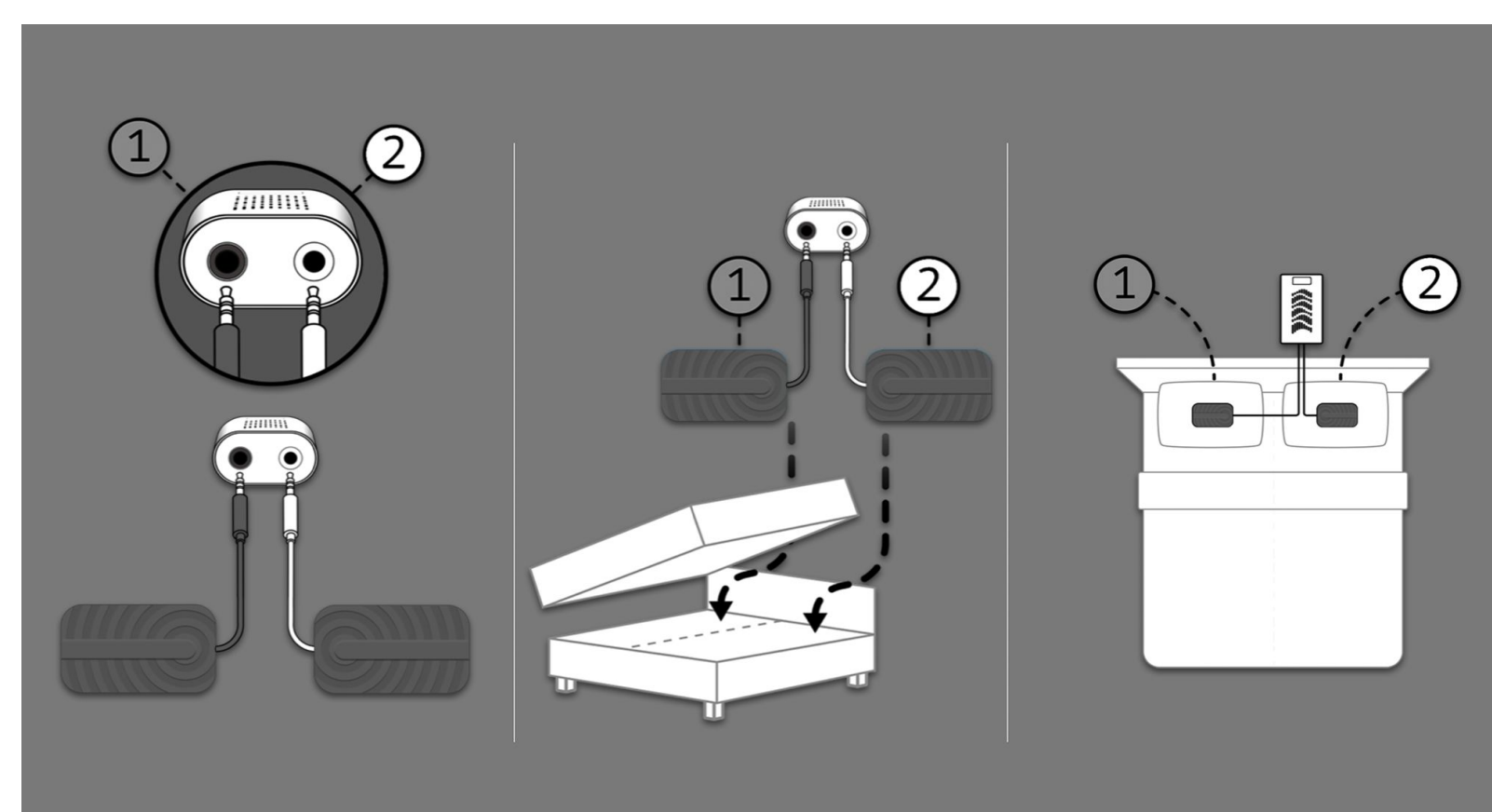
## Methods

Sleep-disordered breathing was analyzed by a commercially available home monitoring device (Sleeptracker-AI<sup>®</sup> Monitor, Fullpower Technologies Inc., California, USA). The device passively monitors sleep using piezoelectric sensors. Validated sleep and respiratory parameters were derived from device data. The de-identified data were analyzed, following review and exemption of the study (#57681) from Stanford University IRB. Data were reviewed from 2021-04-01 to 2022-03-31, in 76,769 individuals with 14,296,394 recorded nights. Individuals with at least 300 nights of recordings were included in the analytic dataset.

## Met Inclusion Criteria

18,252 Participants  
8,592 Men, 49.4 ± 13.5 years  
7,336 Women, 48.9±13.1 years  
2,324 Unspecified Gender, 49.9 ± 14.5 years  
  
5,846,745 Recorded Nights

## Device Setup



## Results

Averaged across pairs of consecutive nights, test-retest for OSA severity showed the following results for first-night prevalence and second-night agreement percentage [with confidence intervals]:

OSA Severity	1 <sup>st</sup> Night Prevalence	2 <sup>nd</sup> Night Agreement
Mild	16.6% [16.0, 17.2]	53.1% [51.1, 55.2]
Moderate	4.3% [3.9, 4.6]	44.6% [40.6, 48.7]
Severe	1.8% [1.6, 2.0]	63.2% [56.9, 69.2]

Second-night agreement is the percentage of those with the given OSA severity on the 1<sup>st</sup> night who had the same severity on the 2<sup>nd</sup> night. These degrees of agreement are consistent with those previously reported.

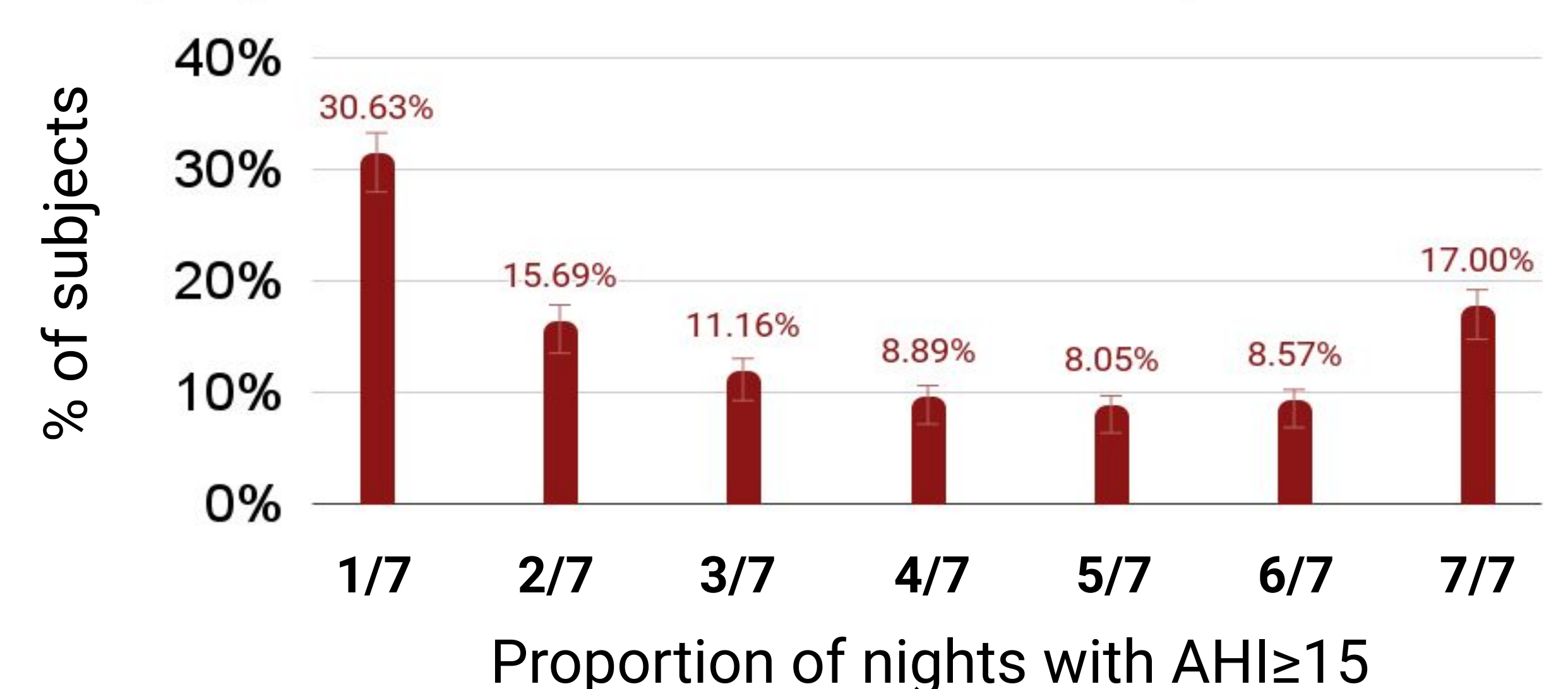
Averaged across weeks, 12.4% [11.7, 13.0] of individuals analyzed met severity criteria for moderate-to-severe OSA (AHI≥15) at least one night out of seven, and we found that the following proportions of such individuals experienced AHI≥15 per given number of nights:

Number of Nights	Proportion of Participants with AHI≥15
One	30.6% [28.1, 33.3]
Two	15.6% [13.7, 17.8]
Three	11.1% [9.5, 13.1]
Four	8.9% [7.4, 10.6]
Five	8.0% [6.6, 9.7]
Six	8.5% [7.1, 10.3]
Seven	17.0% [15.0, 19.2]

Each confidence interval excludes 0%, rejecting the null hypothesis of no AHI variability.

## Frequency of AHI≥15 nights

Among subjects with AHI≥15 at least once that week, averaged across weeks



## Conclusions

The use of a noninvasive in-home monitoring device enables the collection and analysis of sleep and respiratory data on a continuous nightly basis. The prevalence of and variability in sleep-related respiratory events have not been studied in this large of a scale, underscoring the importance of more frequent monitoring in accurately diagnosing OSA and its severity.

## References

Ding F, Cotton-Clay A, Fava L, Easwar V, Kinsolving A, Kahn P, Rama A, Kushida C. Polysomnographic validation of an under-mattress monitoring device in estimating sleep architecture and obstructive sleep apnea in adults. Sleep Med. 2022 Apr 22;96:20-27. doi: 10.1016/j.sleep.2022.04.010. Epub ahead of print. PMID: 35576830.