



Obstructive Sleep Apnea Detection and Prevalence in Men and Women Using a Continuous Large U.S. Sample by Home Under-Mattress Devices

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Introduction

Clinical sleep studies typically rely on one night for OSA detection and prevalence estimates of sleep-related respiratory events rarely use large-scale continuous nightly data. This study is one of the largest for the detection and prevalence of OSA.

Methods

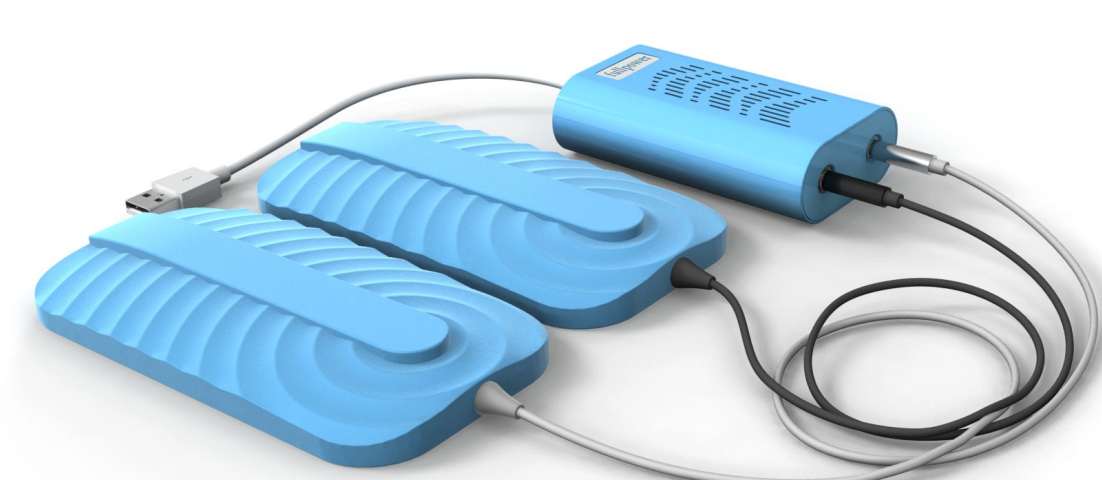
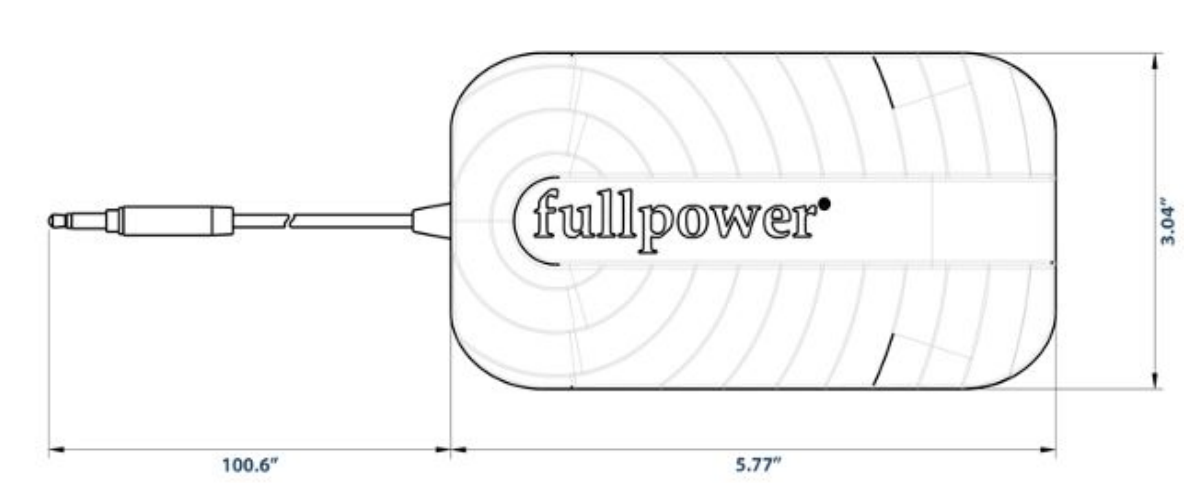
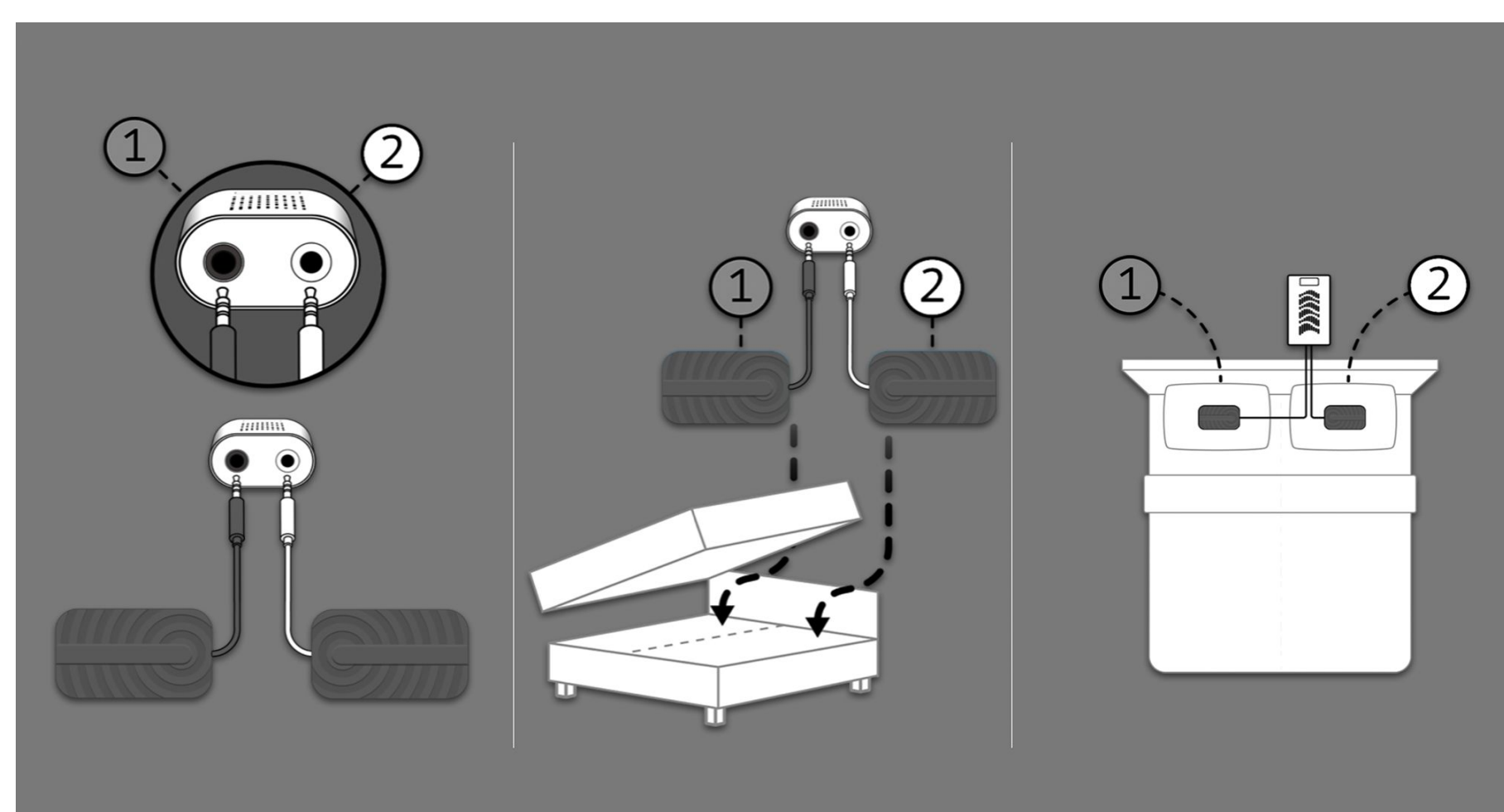
We used a commercially-available home monitoring device (Sleeptracker-AI Monitor, Fullpower Technologies Inc., California, USA) that passively monitors sleep using piezo-electric sensors to analyze sleep-disordered breathing. Using validated sleep/respiratory parameters, de-identified data were analyzed following Stanford IRB review. Data (2021-09-01 to 2023-08-31) were reviewed in 151,013 individuals with 47,964,824 recorded nights, split into two 1-year spans. Per year, individuals with ≥ 300 nights of recordings were included in the analytic dataset.

Met Inclusion Criteria

52,637 Participants
24,297 men, 50.1 \pm 12.8 years
21,310 women, 49.8 \pm 12.8 years
7,030 Unspecified Gender, 51.0 \pm 14.5 years

17,173,525 Recorded Nights Met Inclusion Criteria

Device Setup



Results

For men and women with a healthy BMI ($< 25 \text{ kg/m}^2$) grouped by age (< 50 vs. ≥ 50 years), we found the following OSA (AHI ≥ 5) prevalence:

	Women	Men
Age < 50 years: #	3,696	2,400
Prevalence [CI]	2.8% [2.3%,3.3%]	12.0% [10.7%,13.3%]
Age ≥ 50 years: #	2,983	1,797
Prevalence [CI]	16.8% [15.4%,18.2%]	38.1% [35.9%,40.4%]
Odds Ratio for Age ≥ 50 years vs. < 50 years	7.1 [5.7,8.8]	4.5 [3.9,5.3]

Maximum (but not mean) AHIs for each individual for 3 randomly-selected nights revealed the following sensitivities ($\geq 95\%$) and specificities [and CIs] for detecting any, moderate-to-severe, and severe OSA as categorized by mean AHI over 1 year:

	Sensitivity	Specificity
Any OSA Severity	95.0% [94.9,95.1]	82.5% [82.3,82.8]
Moderate-to-Severe OSA	95.3% [95.1,95.5]	94.3% [94.2,94.4]
Severe OSA	95.8% [95.5,96.2]	97.9% [97.9,98.0]

For maximum AHI over two randomly-selected nights sensitivities were near 90% with a tradeoff for decreased specificities for 3+ nights; sensitivities for a single night were in the low 70s.

OSA severity decreases by 2+ categories (i.e., moderate to normal, severe to mild/normal) were found for moderate-to-severe and severe OSA subjects over 1 year, with means of 4.8 \pm 7.0% and 5.1 \pm 6.6% nights, respectively.

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. One night appears insensitive for detecting OSA, and maximum AHI across 3 nights may be better for detecting moderate and severe OSA. Women ≥ 50 y have a greater increase in odds of OSA vs. < 50 y compared to men of similar age groups, which may be due to peri-/postmenopause and other factors.

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.