

HOME VS LAB POLYSOMNOGRAPHY WITH A PATCH-BASED SYSTEM: LONGER, MORE EFFICIENT SLEEP AT HOME WITHOUT RESPIRATORY TRADE-OFFS

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INTRODUCTION

Laboratory schedules, unfamiliar surroundings, and equipment burden may distort sleep during laboratory testing. Home PSG systems may capture more representative sleep while preserving full signal fidelity. The Onera Sleep Test System (STS) is a patient applied, patch-based device which enables studies to be performed unattended at the patient's home.

AIM

To compare sleep timing, architecture, respiratory indices and the patients' experience using the patch-based device in the home and laboratory environments.

METHODS

- 7 sleep clinics
- Phase I: side-by-side in-lab PSG & patch-based PSG
- Phase II: self-applied patch-based home PSG
- Studies that met rigorous selection criteria (TIB, TST, signal quality, time between recordings) were scored

RESULTS

	LAB (N=344)	HOME (N=179)	SCORED SUBSET (N=52)
Gender [%M/F]	66.3% / 33.7%	68% / 32%	71.1% / 28.9%
Age [years]	50.6 ± 12.7	50.1 ± 12.7	51.2 ± 12.0
BMI	30.3 ± 4.6	30.7 ± 5.9	30.3 ± 4.6

Table 1. Reported as mean ± SD unless otherwise stated

SLEEP TIMING DIFFERENCES

Clinic (N=344)	Average Lights-Off	Average Lights-On	Average TIB (hrs)
A	21:56	04:56	7.0
B	22:14	06:26	8.2
C	22:35	05:11	7.8
D	22:18	05:22	7.0
E	20:49	05:29	8.7
F	22:37	05:55	7.3
G	22:00	04:52	6.9
Average	22:10	05:33	7.4
Home (N=179)	Average Lights-Off	Average Lights-On	Average TIB (hrs)
All	22:59	06:38	7.7
Weekday	22:50	06:21	7.5

Table 2. The average lights-on and -off time for lab and home sleep studies. There was large variability in laboratory lights-on times and overall large differences (~1 hr) between lab and home sleep timing.

PATIENT FEEDBACK

Compared to home, how would you rate your sleep in the lab last night?

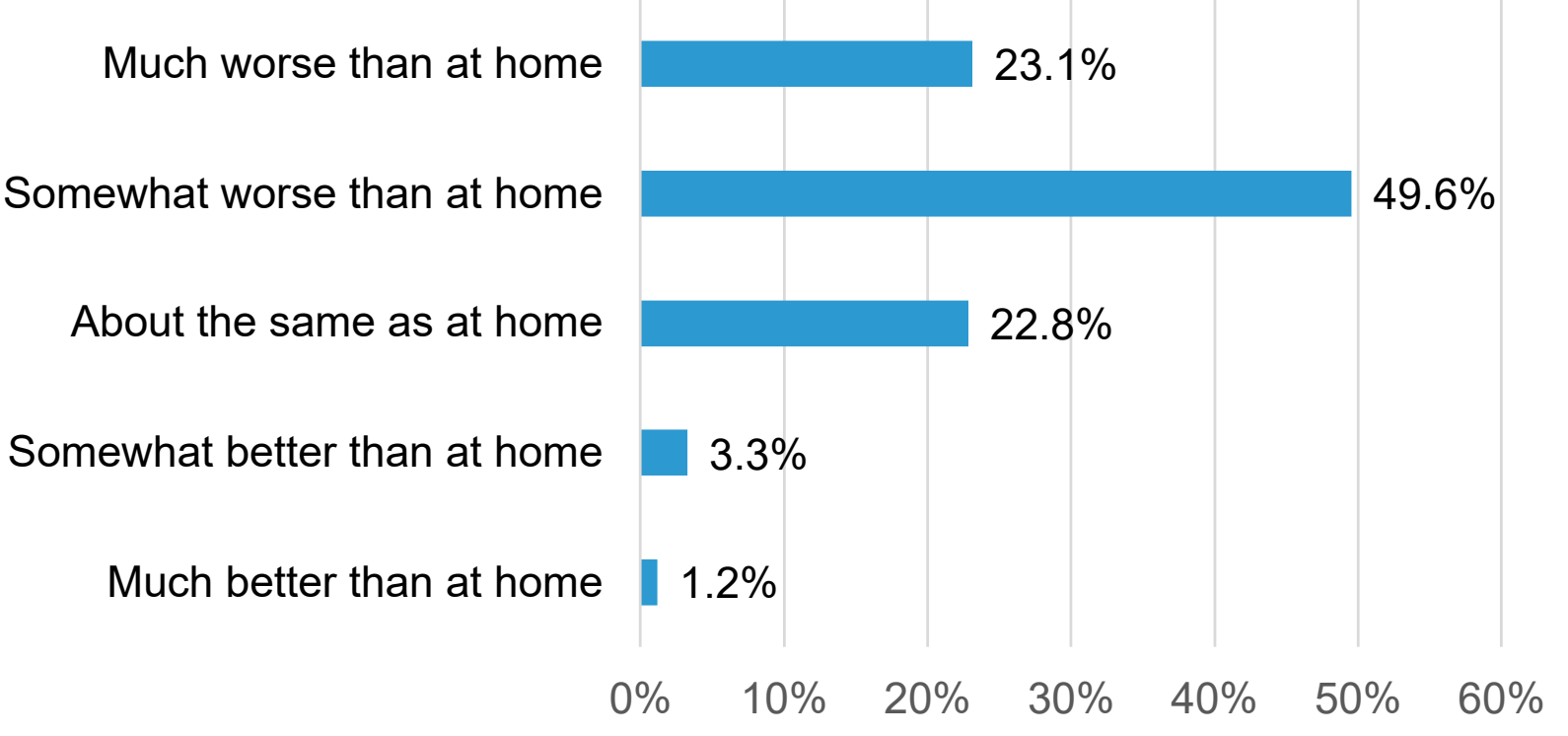


Figure 3: In the laboratory survey most subjects (~73%) indicated worse sleep in the lab compared to home (N=328).

In general, how satisfied were you with the Onera STS?

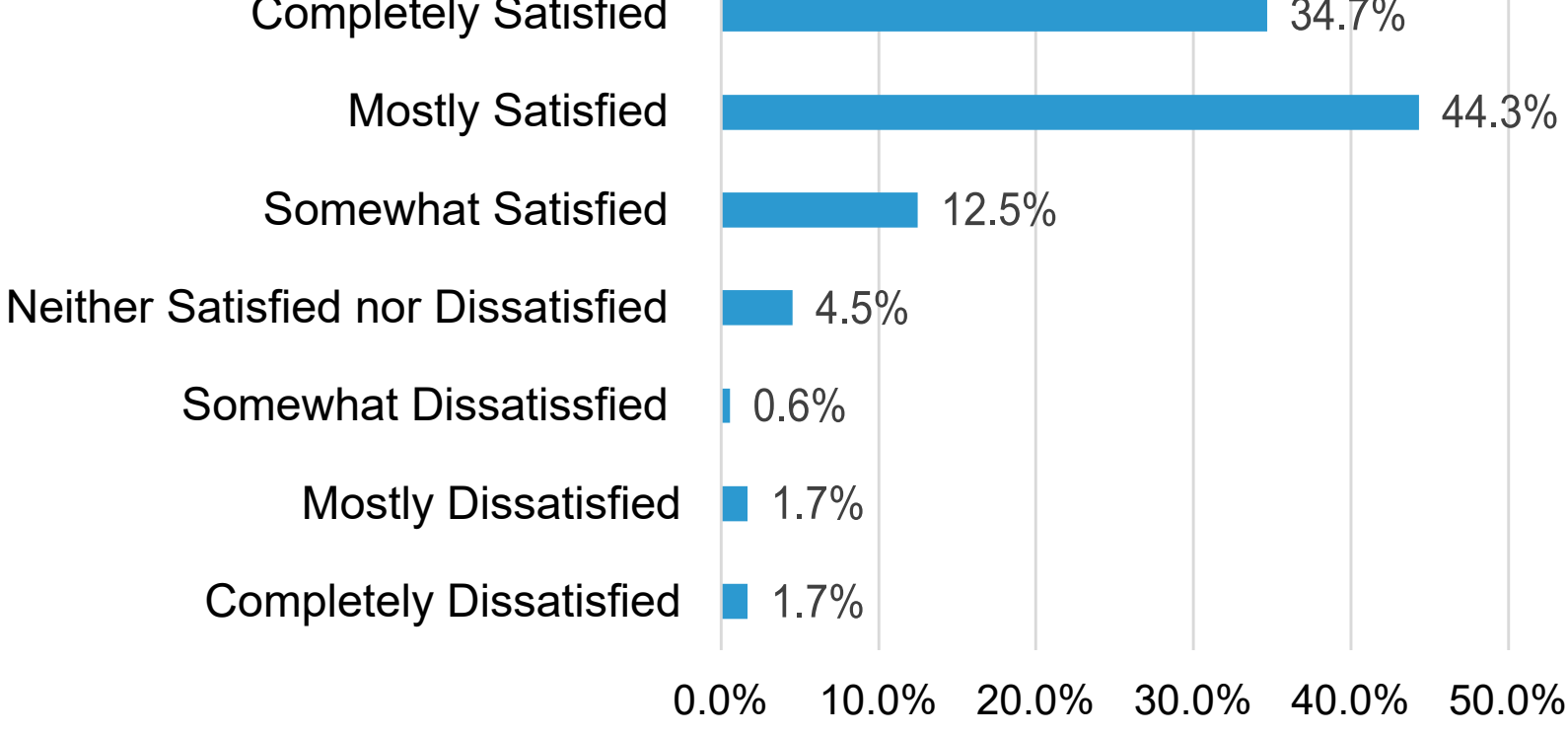


Figure 5: In the home survey most subjects (~92%) indicated satisfaction with the Onera device (N=176).

I am confident that I placed the patches and pods correctly.

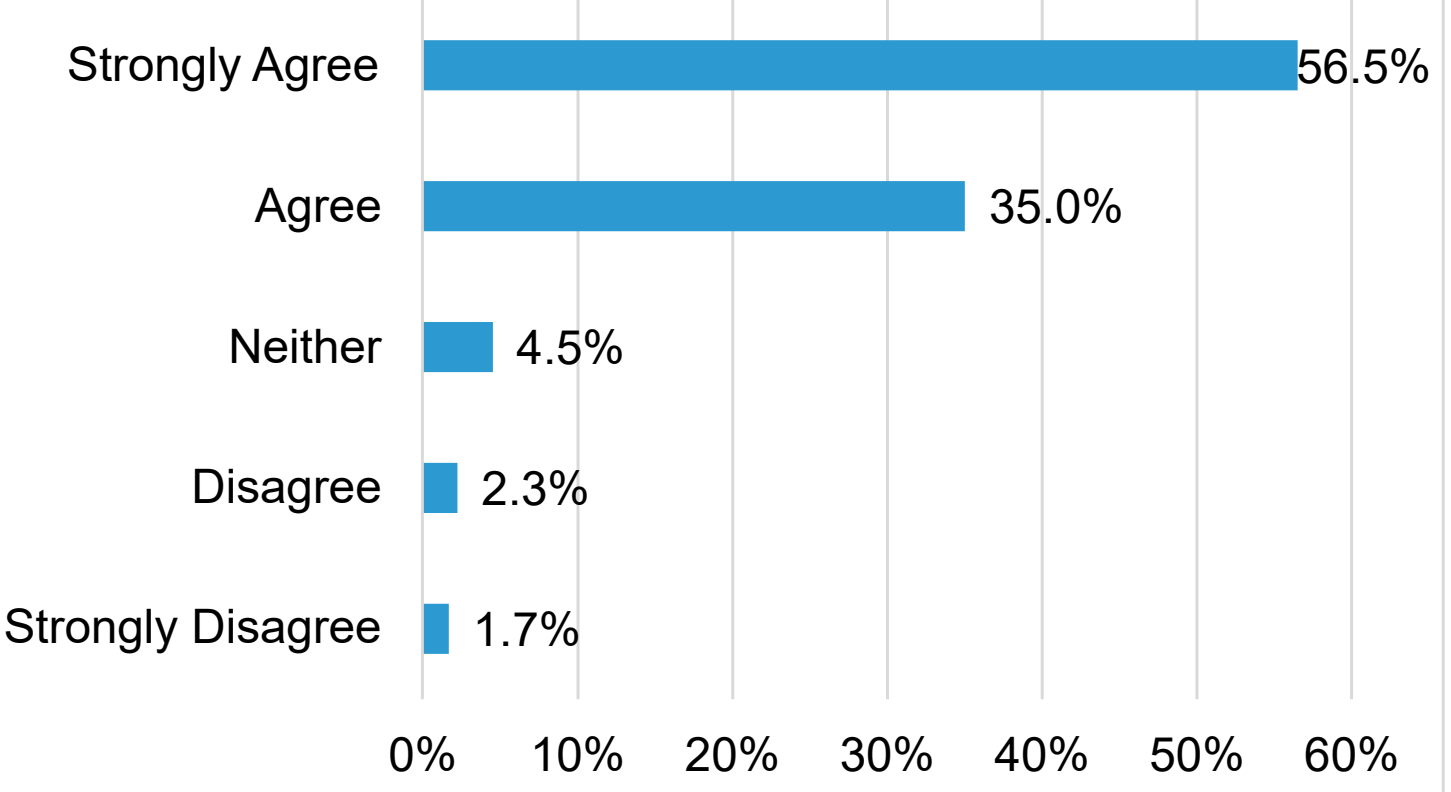


Figure 7: In the home survey most subjects (~92%) indicated that they felt confident in device application (N=177).

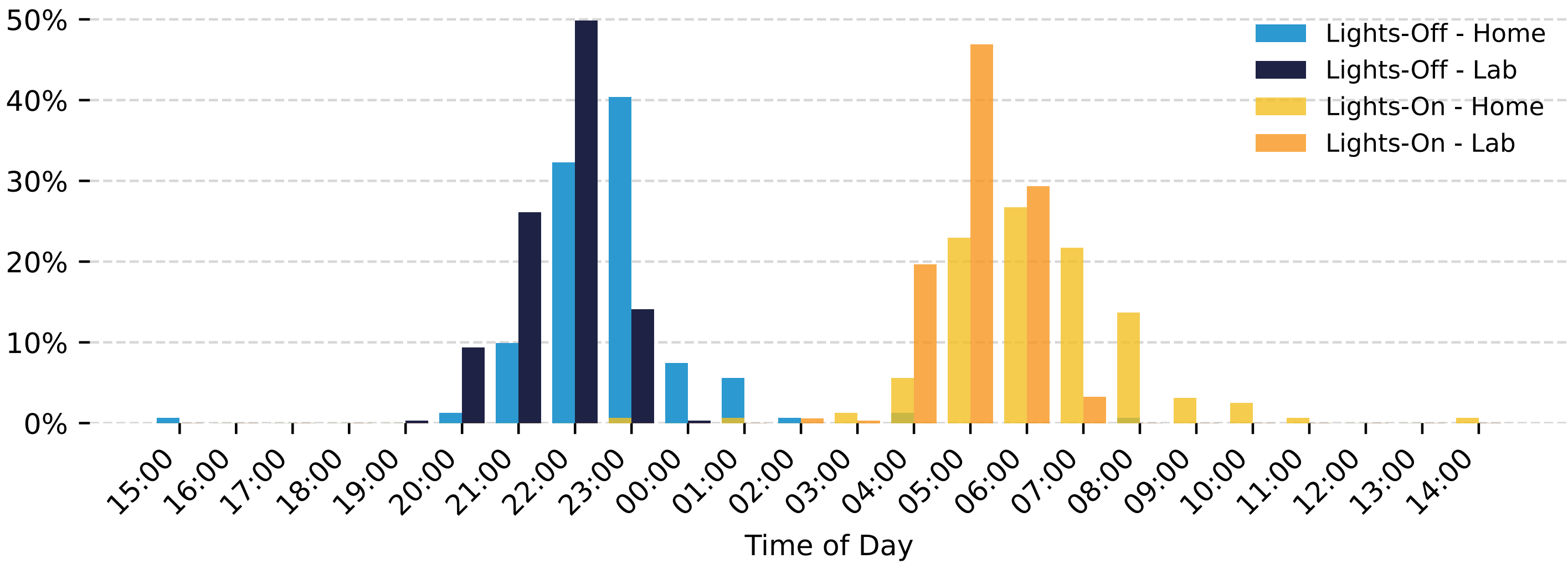
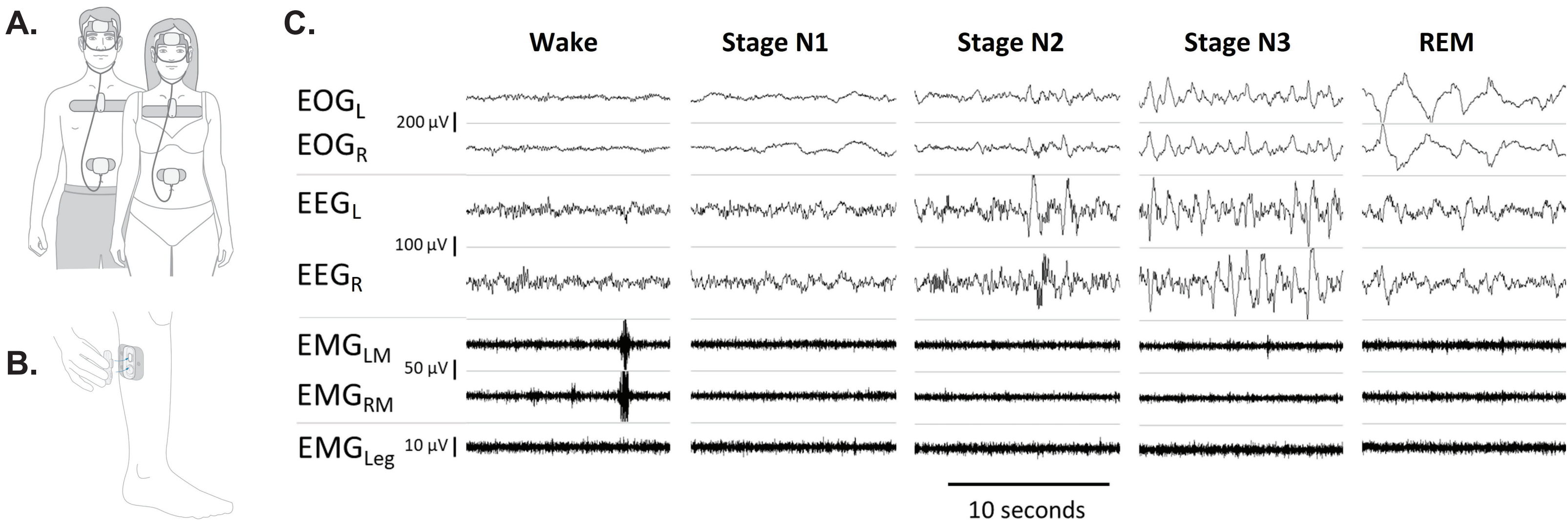


Figure 1. (Above) The patch-based hPSG system consists of 4 sensors located on the head, chest, abdomen (A) and leg (B). A subset of signals (EEG Frontal, EOG, EMG masseter and EMG leg) during the different stages of sleep can be found in (C).

Figure 2. (Left) The distribution of lights off times (blue) and lights on time (yellow) for subjects with lab (N=344) and home (N=179) studies. Overall, home sleep studies had later lights-off and lights-on times with larger variability compared to lab times.

SLEEP SUMMARY STATISTICS

VARIABLE	LAB	HOME	P-VALUE
SLEEP			
Lights-Off	22:13 ± 38.8	22:39 ± 40.6	<0.01
Lights-On	06:01 ± 52.4	06:10 ± 64.2	0.25
TST (min)	378.3 ± 72.4	388.2 ± 62.5	0.27
NREM (min)	300.6 ± 60.1	301.2 ± 50.1	0.47
N1 (min)	41.2 ± 35.4	36.0 ± 20.8	0.09
N2 (min)	196.8 ± 56.9	194.1 ± 42.4	0.61
N3 (min)	62.5 ± 31.8	71.1 ± 36.1	0.03
NREM (%)	79.6 ± 0.1	77.8 ± 0.1	0.14
REM (min)	77.7 ± 29.5	86.9 ± 27.1	0.11
REM (%)	20.4 ± 0.1	22.3 ± 0.1	0.14
REM Cycles	4.3 ± 1.7	4.9 ± 1.8	0.10
ROL (min)	102.1 ± 57.5	83.1 ± 43.4	0.03
SE (%)	80.5 ± 12.5	88.3 ± 9.6	<0.01
SOL (min)	20.2 ± 19.3	22.7 ± 37.0	0.33
WASO (min)	57.9 ± 46.5	22.7 ± 23.4	<0.01
RESPIRATORY			
AHI	29.7 ± 21.7	28.1 ± 21.2	0.25
NREM AHI	28.7 ± 23.1	27.8 ± 22.6	0.25
REM AHI	33.4 ± 25.9	29.2 ± 21.7	0.13
HI	14.9 ± 11.2	16.9 ± 11.6	0.15
AI	14.7 ± 20.0	11.2 ± 11.6	0.09
CAI	2.3 ± 5.3	1.7 ± 2.9	0.16
OAI	12.4 ± 20.0	9.5 ± 11.2	0.12
ODI	21.7 ± 20.4	20.2 ± 20.0	0.23
Arousal Index	20.5 ± 15.3	18.9 ± 13.6	0.21
POSITION			
PRONE %	3.4 ± 0.1	4.1 ± 0.1	0.34
UPRIGHT %	0.8 ± 0.0	1.4 ± 0.0	0.06
LEFT %	23.1 ± 0.2	24.8 ± 0.2	0.30
RIGHT %	21.8 ± 0.2	24.9 ± 0.2	0.19
SUPINE %	50.8 ± 0.3	44.8 ± 0.2	0.05

Table 3: Subjects that met selection criteria had their data scored. When comparing lab and home results for the same patients on weeknights (N=39), we see statistically significant differences (highlighted in light blue) in TST, REM related variables, sleep efficiency and supine position.

Did you experience any issues with the Onera STS?

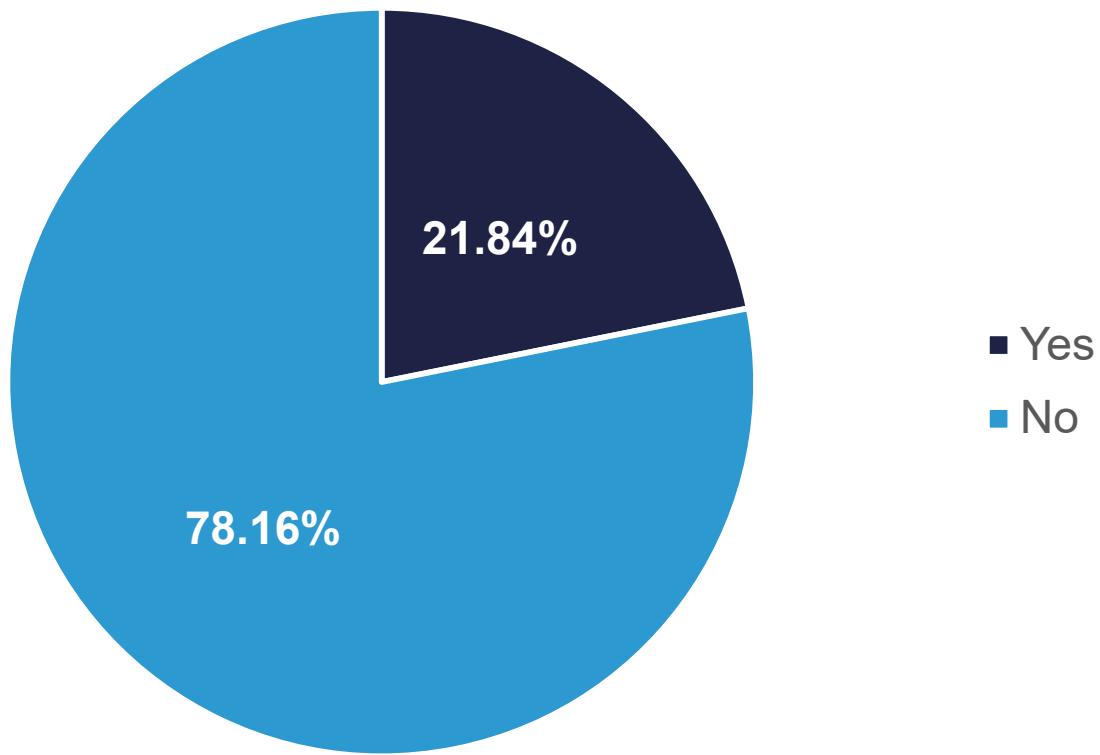


Figure 4: In the home survey most subjects (~78%) reported no issues with the Onera device (N=174).

The Onera STS was comfortable to wear.

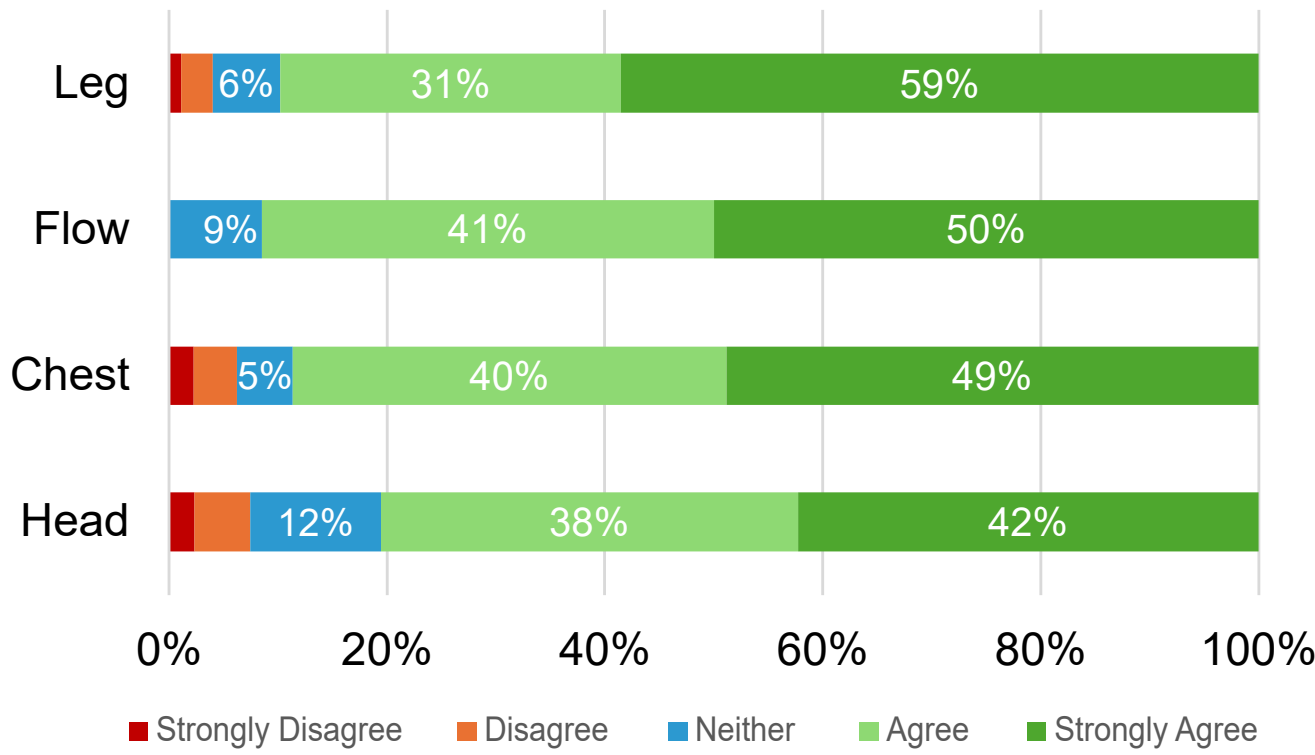


Figure 6: In the home survey most subjects (80-91%) indicated that the individual components of the device were comfortable (N=176).

CONCLUSION

These findings support home PSG use to obtain more representative sleep architecture without compromising detection of sleep-disordered breathing.



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