

# Gender differences in sleep timings, sleep hygiene, healthy sleep and sleep difficulties

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## ABSTRACT

**Background:** Women report shorter sleep times and sleep less efficiently than men, although objective sleep assessments indicate that they sleep longer and more efficiently (Kocevska et al., 2021). The aim of our study was to investigate gender differences in self-reported sleep timings, sleep hygiene practices, healthy sleep and sleep difficulties in a community sample. **Methods:** One hundred and eleven individuals (M= 44.3 ± 9.97 years, 72.1% female) from a public Portuguese organization participated in the study. Employees completed a booklet of questionnaires about sociodemographic characteristics, sleep timings (bedtime, sleep latency, wake up time, sleep inertia), sleep hygiene practices (Sleep Hygiene Index), healthy sleep (Healthy Sleep Scale) and sleep difficulties (ICSD-3/DSM-5-TR insomnia symptoms/cases). Profile of Mood States, Eysenck Personality Inventory, Arousal Predisposition Scale and WHO-5 Well Being Index were equally answered. SPSS 28 was used for statistical analyses. **Results:** Men reported later bedtimes and sleeping shorter time than women (M= 24:20 ± 1:05 versus M=23:32 ± 0:58,  $p < .001$ ; M= 6:51 ± 0:53 vs. M=7:31 ± 0:56,  $p = .001$ , respectively) and referred more frequently overall disruptive sleep hygiene practices (M=26.8 ± 5.09 vs. M= 24.1 ± 5.11,  $p = .016$ ), particularly reported more often using alcohol, tobacco or caffeine 4h before bedtime (M= 2.2 ± 1.23 vs. M=1.6 ± .95,  $p = .035$ ), sleeping on an uncomfortable bed (M= 1.5 ± .63 vs. M=1.3 ± .74,  $p = .017$ ) or uncomfortable bedroom (M= 1.6 ± .89 vs. M=1.2 ± .62,  $p < .001$ ). Females reported less healthy sleep (M= 13.3 ± 4.24 vs. M=15.2 ± 3.89,  $p = .028$ ), more insomnia symptoms (ICSD-3, M= 8.2 ± 2.79 vs. M=6.7 ± 2.26,  $p = .007$ ; DSM-5-TR, M= 7.5 ± 2.90 vs. M=6.0 ± 2.36,  $p = .018$ ) and insomnia cases included only women (ICSD-3, n=10; DSM-5-TR, n=8). Females also reported significantly less well-being (M= 57.3 ± 20.57 vs. M=65.2 ± 20.03,  $p = .037$ ). Mood states and personality traits were not significantly different between genders. **Conclusion:** Results of our study corroborate previous findings that women report more disturbed sleep (insomnia symptoms/cases) and less healthy sleep. However, women referred sleeping longer than men, which was not completely expected. Women may report longer sleep to compensate for their disturbed sleep. **Conflict of Interest:** No

## INTRODUCTION

Women report shorter sleep times and sleep less efficiently, although objective sleep assessments indicate that they sleep longer and more efficiently (1).

**AIM** of our study was to investigate gender differences in self-reported sleep timings, sleep hygiene practices, healthy sleep and sleep difficulties in a community sample.

## METHODS

### SAMPLE

111 employees, M= 44.3 ± 9.97 years, 72.1% female, from a public Portuguese organization participated in the study.

### PROCEDURES

After written consent, employees completed a booklet of questionnaires about sociodemographic characteristics, sleep timings, sleep hygiene practices, healthy sleep, sleep difficulties (ICSD-3/DSM-5-TR insomnia symptoms/cases), mood, neuroticism and extraversion, arousability predisposition and overall well-being when attending their routine occupational medical appointment (2,3).

### INSTRUMENTS

#### Sleep timings

Self-reported habitual bedtime, average time to fall asleep (after bedtime), habitual wake up time, average time to rise (after waking up) during week and weekend (2,3).

#### Sleep Hygiene Index (SHI)

Includes 13 items about inadequate sleep behaviours and attitudes. Response scale to each item include 5 options that vary from 5=always to 1=never. Total score can range from 63 (indicating less adequate sleep hygiene practices) to 13 values (more appropriate sleep hygiene practices) (3,4).

#### Healthy Sleep Scale (HSS)

The scale has 4 questions related to healthy sleep: Do you have a calm/peaceful sleep? Do you sleep deeply? Do you have good sleep quality? Are you satisfied with your sleep? Response option included the following option: 1=never/almost never; 2=rarely; 3=sometimes, 4=often (3 or more times per week) and 5=almost always/always. Higher scores indicate healthier sleep. The scale has shown good psychometric properties (5). HSS was developed by Leão et al. (5) based on a previous healthy sleep variable (6–8).

#### Insomnia Scale (IS): ICSD-3/DSM-5-TR insomnia symptoms/cases

A questionnaire was used to define individuals with chronic insomnia which was derived from a pre-existing questionnaire (9). Based on answers obtained to this sleep questionnaire it was possible to define a chronic insomnia episode according to diagnostic criteria of the International Classification of Sleep Disorders third edition, ICSD-3 (10) and to identify a case of persistent insomnia according to the Diagnostic and Statistical Manual of Mental Disorders, 5<sup>th</sup> edition, Text Revised, DSM-5-TR (11) (2,3).

**ICSD-3 chronic insomnia cases** individuals with difficulties initiating, maintaining sleep or waking up earlier than desired (criterion A) and with associated impaired daytime functioning (criterion B), despite adequate opportunity and appropriate conditions for sleep (criterion C); difficulties in sleeping occurred 3 times or more per week (criterion D) for 3 months (criterion E). Questions to assess these criteria are described in detail elsewhere (6). Ten workers of our sample met ICSD-3 insomnia criteria.

**DSM-5-TR persistent insomnia cases** involved participants with dissatisfaction with sleep quantity or quality and associate difficulty initiating sleep or difficulty maintaining sleep (frequent awakenings or difficulty returning to sleep after awakenings) or early morning awakening with inability to return to sleep (Criterion A); causing clinically significant distress or impairment in social, occupational, educational, academic, behavioral impairment or other important areas (Criterion B) occurring at least 3 nights per week (Criterion C); present for at least 3 months (Criterion D) despite adequate opportunity to sleep (Criterion E).

To define ICSD-3 and DSM-5-TR insomnia cases participants who reported sleep disorders (sleep apnea, restless leg syndrome or narcolepsy) were not included (n=11) (Criterion F, ICSD-3 and DSM-5-TR)

#### Profile of Mood States

Includes 65 mood adjectives with a response scale ranging from 0=not at all to 4=extremely. Sub-scales: tension-anxiety, depression-dejection, anger-hostility, confusion-bewilderment, fatigue-inertia and vigour-activity. Higher values on each sub-scales suggest higher values on the mood dimension evaluated.(12,13).

#### Eysenck Personality Inventory (EPI)

Evaluates neuroticism and extraversion/introversion personality traits. A 12-item short version was used (6 items measured neuroticism, 6 items evaluated extraversion/introversion). Response scale with 4 options ranging from 1=almost never to 4= almost always. Higher values indicate greater neuroticism and extraversion. (14,15).

#### Arousal Predisposition Scale (APS)

Incorporates 12 items that assess individual predisposition for cognitive activation. Response scale to each item varies from 1 (never) to 5 (almost always). Higher scores indicate greater predisposition to arousal (1 item is recoded inversely). (2,16)

#### WHO-5 Well Being Index (WHO-5 WBI)

Integrates 5 items that evaluate general well-being. Response scale to each item varies from 0=at no time to 5=all the time. Total score ranges from 0 to 25 and is multiplied by 4 (range 0-100). Higher scores represent better well-being (6,17)

### STATISTICAL ANALYSES

SPSS 28 was used. Mann Whitney U tests were applied to explore gender differences in sleep timings, sleep hygiene practices, healthy sleep, sleep difficulties, mood states, personality and well-being.

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## RESULTS

♀ **Women** in comparison to ♂ **Men reported** (see Table):

- earlier bedtimes and longer sleep duration;
- less frequently overall disruptive sleep hygiene practices, particularly using less alcohol, tobacco or caffeine 4h before bedtime and less frequently sleeping on an uncomfortable bed or uncomfortable bedroom;
- less sleep quality, less satisfaction with sleep and less overall healthy sleep; more insomnia symptoms (ICSD-3/DSM-5-TR) and insomnia cases only included women (ICSD-3, n=10; DSM-5-TR, n=8);
- less well-being, particularly feeling less active and vigorous and to wake up feeling less fresh and rested.

Table: Sleep timings during week, sleep hygiene, healthy sleep and sleep difficulties by gender

	N= 80	♀	N= 31	♂	
	M	±	M	±	p
<b>Sleep timings</b>					
Bedtime	23:32	0:58	24:20	1:05	<b>&lt;.001</b>
Sleep duration week	7:31	0:56	6:51	0:53	<b>.001</b>
<b>Sleep Hygiene Index</b>					
Alcohol, tobacco or caffeine 4h before bedtime	1.6	.95	2.2	1.23	<b>.035</b>
Sleep on an uncomfortable bed	1.3	.74	1.5	.63	<b>.017</b>
Sleep in an uncomfortable bedroom	1.2	.62	1.6	.89	<b>&lt;.001</b>
Sleep hygiene total score	26.8	5.09	24.1	5.11	<b>.016</b>
<b>Healthy sleep</b>					
Good sleep quality	3.3	1.13	3.7	1.09	<b>.047</b>
Sleep satisfaction	3.1	1.22	3.8	1.14	<b>.009</b>
Healthy sleep scale total score	13.3	4.24	15.2	3.89	<b>.026</b>
<b>ICSD-3 insomnia symptoms</b>					
DMS	3.3	1.25	2.5	1.24	<b>.003</b>
GSD ICSD-3	8.2	2.90	6.7	2.26	<b>.007</b>
<b>DSM-5-TR insomnia symptoms</b>					
DMS	2.8	1.25	2.1	1.23	<b>.011</b>
GSD DSM-5-TR	7.5	2.90	6.0	2.36	<b>.018</b>
<b>Well-being</b>					
WBI-3 active/vigorous	3.0	1.12	3.5	1.03	<b>.033</b>
WBI-4 woke up fresh and rested	2.2	1.31	2.7	1.46	<b>.033</b>
Well-being total score	57.3	20.57	65.2	20.03	<b>.037</b>

♀: FEMALE; ♂:MALE; BOLD: Significant results at  $p < .05$ ; DMS: Difficulties maintaining sleep; GSL: Global sleep disturbance.

## CONCLUSIONS

- Results of our study corroborate previous findings that women report more disturbed sleep (insomnia symptoms/cases) and less healthy sleep.
- However, women referred sleeping longer than men, which was not completely expected. Women may report longer sleep duration to counterbalance their disturbed sleep.
- The fact that women reported earlier bedtimes could also contribute for their disturbed sleep. Eventually they could benefit from slightly delaying their bedtime, increasing sleep pressure, and improve their sleep quality.
- The observation that women reported less inadequate sleep hygiene practices related with alcohol, tobacco or caffeine 4h before bedtime and sleeping on sleeping an uncomfortable bed/bedroom, may suggest that behavioural or environmental factors are assured and do not contribute to their sleep difficulties. Cognitive (worry, rumination) or biological (hormones) factors may need more further attention/consideration.
- Limitations of the study include the small sample size and the unbalanced gender participation (more women than men) which compromises generalization of results;
- In future studies it would be important to have a more representative sample of the active working population (size and gender distribution) and to use an objective evaluation of sleep (actigraphy or portable PSG) to corroborate or not the subjective sleep reports.

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