

The SHINE Survey: Uncovering Gender Differences in Psychosocial Burden of Obstructive Sleep Apnea

Monica Mallampalli¹, Alissa Mendoza², Emma Cooksey³, John Yee², Elizabeth Brouwer⁴, Lisa Bloudek⁴, Rainie Wu⁴, Kristina S. Yu²
¹ Alliance of Sleep Apnea Partners , Ellicott City, MD, ² Apnimed, Inc., Cambridge, MA, ³ Project Sleep, Los Angeles, CA, ⁴ Curta, Inc., Seattle, WA

INTRODUCTION

- Obstructive sleep apnea (OSA) is a serious, chronic sleep-related breathing disease in which the airway is obstructed during sleep causing disrupted breathing, sleep fragmentation, and reduced oxygenation.¹
- OSA is caused by sleep-related neuromuscular dysfunction and predisposing anatomic abnormalities of the upper airway.²
- OSA is estimated to affect nearly 1 billion people worldwide³ and over 80 million adults (20+ years) in the U.S.⁴ Approximately 49% men and 23% women have OSA.⁵
- Symptoms of OSA differ notably between genders. Men are more likely to exhibit classic symptoms such as loud snoring and noticeable breathing pauses, whereas women frequently present with less typical symptoms including fatigue, insomnia, depression, anxiety, and mood disturbances.⁶
- These gender-specific symptom presentations can lead to significant underdiagnosis among women, as atypical symptoms often do not align with common perceptions of OSA and current OSA screeners may not adequately capture gender differences.
- Importantly, women's risk increases substantially after menopause due to hormonal changes, particularly the reduction in estrogen and progesterone levels.⁵
- The objective of this analysis was to assess the psychological and social impact of OSA by gender in U.S. adults with diagnosed OSA.

METHODS

The SHINE (Sleep Health Inquiries on Needs and Emotions) online patient survey, developed in partnership with the Alliance of Sleep Apnea Partners (ASAP), Project Sleep and OSA experts, was administered to 1,500 OSA patients in the U.S. This de-identified survey dataset includes demographic information, clinical characteristics, symptoms, self-reported comorbid conditions, and impacts on negative feelings for people living with OSA.



Descriptive and adjusted analyses were used to achieve the objectives:

- Descriptive comparison was performed across gender using Chi-square tests/Fisher's Exact tests and t-tests/Mann-Whitney U tests, as appropriate for the variables.
- Adjusted analyses were assessed via Generalized Linear Models (GLM) with binomial distribution and logit link function on binary outcomes, adjusted for age group, BMI category, race, region, income level, comorbidities, and time since diagnosis.

Outcomes of interest:

- Patients experienced ≥2 negative OSA symptoms in the past 30 days
- Patients experienced ≥2 negative feelings with OSA in the past 30 days
- Patients agreed (6 or 7 on a 7-point Likert scale [1-7, Strongly Disagree to Strongly Agree]) with ≥2 statements of OSA negatively affecting relationships.

ABBREVIATIONS

ADD - Attention-deficit disorder; ADHD - Attention-deficit/hyperactivity disorder; Afib - Atrial Fibrillation; BMI – Body Mass Index; CHF - Congestive Heart Failure; GLM – Generalized Linear Model; OR – Odds Ratio; OSA – Obstructive Sleep Apnea; p-value – probability value; Ref – Reference group; SHINE – Sleep Health Inquiries on Needs and Emotions; U.S. – United States

FUNDING STATEMENT

This study was funded by Apnimed, Inc.

RESULTS

Women with Obstructive Sleep Apnea experienced greater psychosocial burden and more severe negative feelings compared to men.

Table 1. Demographic and Clinical Characteristics of SHINE Participants, by Gender.

	Total	Male	Female	p-value
N (%)	1500 (100%)	755 (50.3%)	745 (49.7%)	
Age, Mean (SD)	46.0 (15.2)	50.7 (14.5)	41.2 (14.4)	<0.001
BMI, Mean (SD)	30.3 (11.2)	29.5 (9.9)	31.0 (12.4)	0.011
Race*, N (%)				
White	1132 (75.5%)	550 (72.8%)	582 (78.1%)	0.021
Black/African American	278 (18.5%)	136 (18.0%)	142 (19.1%)	0.649
Alaska Native	26 (1.7%)	26 (3.4%)	0 (0%)	0.000
Asian	37 (2.5%)	23 (3.0%)	14 (1.9%)	0.197
Region, N (%)				
Northeast	255 (17.0%)	129 (17.1%)	126 (16.9%)	
Midwest	311 (20.7%)	142 (18.8%)	169 (22.7%)	
South	676 (45.1%)	328 (43.4%)	348 (46.7%)	0.003
West	258 (17.2%)	156 (20.7%)	102 (13.7%)	
OSA Severity, N (%)				
Mild	192 (12.8%)	84 (11.1%)	108 (14.5%)	
Moderate	807 (53.8%)	364 (48.2%)	443 (59.5%)	<0.001
Severe	450 (30.0%)	282 (37.4%)	168 (22.6%)	
Unknown	51 (3.4%)	25 (3.3%)	26 (3.5%)	
Comorbidities*, N (%)				
Diabetes (Type I or II)	504 (33.6%)	291 (38.5%)	213 (28.6%)	
ADHD or ADD	352 (23.5%)	145 (19.2%)	207 (27.8%)	
Anxiety	807 (53.8%)	326 (43.2%)	481 (64.6%)	
Asthma	428 (28.5%)	173 (22.9%)	255 (34.2%)	<0.001
Depression	725 (48.3%)	274 (36.3%)	451 (60.5%)	
Heart failure / CHF or Afib	182 (12.1%)	119 (15.8%)	63 (8.5%)	
Hypertension / high blood pressure	655 (43.7%)	364 (48.2%)	291 (39.1%)	
No comorbidities besides OSA	162 (10.8%)	106 (14.0%)	56 (7.5%)	
Time since Diagnosis, N (%)				
Less than 1 year ago	236 (15.7%)	96 (12.7%)	140 (18.8%)	
1-5 years ago	765 (51.0%)	344 (45.6%)	421 (56.5%)	<0.001
6-10 years ago	261 (17.4%)	162 (21.5%)	99 (13.3%)	
More than 10 years ago	238 (15.9%)	153 (20.3%)	85 (11.4%)	

* Due to space limitation, not all comorbidities are shown in this table.

Figure 1. OSA Symptoms by Gender.

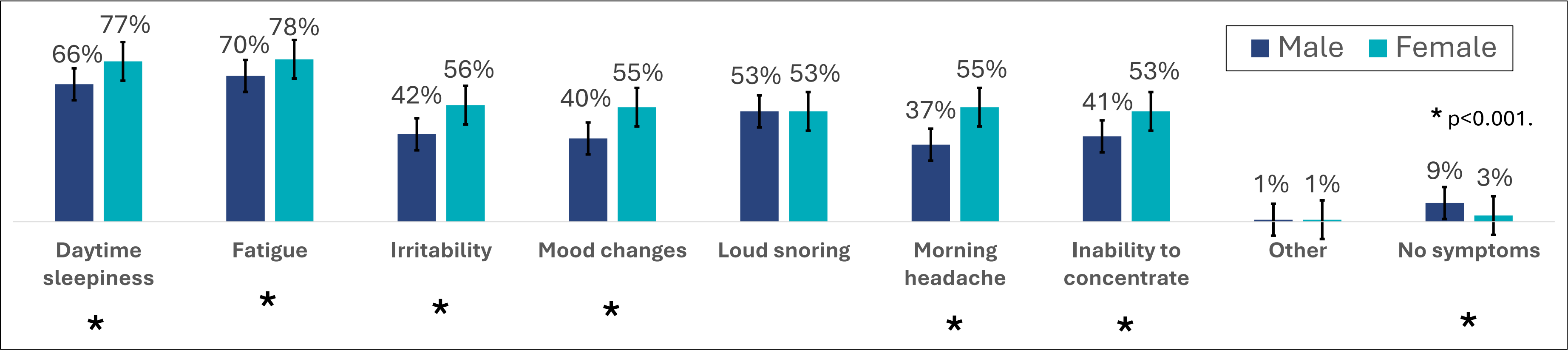


Figure 2. Negative Feelings Associated with Living with OSA by Gender.

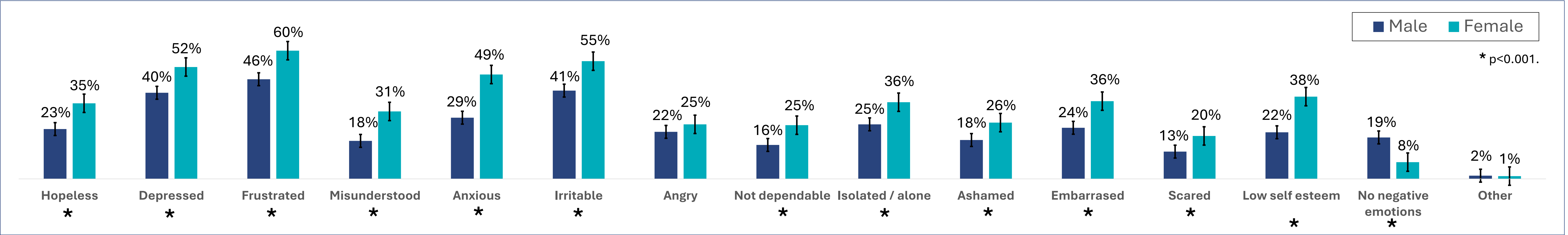


Table 2. Adjusted Analysis for Outcomes of Interest.

Gender	Reported ≥2 Symptoms of OSA		Agreed with ≥2 Statements of OSA negatively affecting relationships		Reported ≥2 Negative Feelings Associated with OSA	
	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value
Male	Ref	Ref	Ref	Ref	Ref	Ref
Female	1.52 (1.01-2.29)	0.043	1.42 (1.10-1.83)	0.007	1.61 (1.15-2.25)	0.006

Adjusted for Baseline Characteristics Including Age, BMI, race, region, income, comorbidities, time since OSA diagnosis, and OSA severity.

CONCLUSIONS

- OSA manifests differently in women compared to men, with distinct symptoms and impacts on personal life.
- Our study further supports gender differences in patient reported outcomes, with women experiencing a higher psychosocial burden and more severe lived experiences as compared with men, even after adjusting for baseline characteristics.
- The more severe negative impacts reported by women indicate potential gaps in current screening practices, diagnostic and screening criteria, and treatment protocols, which may inadequately address the unique needs of female patients.
- Collectively, these findings underscore the critical importance of integrating gender-specific approaches into clinical guidelines. Enhanced awareness and targeted approaches can ensure more effective identification, accurate diagnosis, and tailored management strategies for women and men with OSA.

LIMITATIONS

- Because the survey relies on self-reported data, findings may be influenced by participants' ability to recall.
- Given the cross-sectional design, causal relationships cannot be established.
- Unmeasured confounders not captured by the survey may influence the findings.

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DISCLOSURES

MM is an employee of the Alliance of Sleep Apnea Partners. AM, JY, KSY are employees of Apnimed, Inc. EC is an employee of Project Sleep, consultant for Apnimed, Inc, and advisor for React Health. EB, LB, and RW are employees at Curta, Inc.



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