Obstructive Sleep Apnea and Quality of Life: Comparison of the SAQLI, FOSQ, and SF-36 Questionnaires

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Abstract

Introduction: The impact of sleep on quality of life (QoL) has been well documented; however, there is a great need for reliable QoL measures for persons with obstructive sleep apnea (OSA). We compared the QoL scores between the 36-Item Short Form of the Medical Outcomes Survey (SF-36), Calgary Sleep Apnea Quality of Life Index (SAQLI), and Functional Outcomes Sleep Questionnaire (FOSQ) in persons with OSA.
Methods: A total of 884 participants from the Sleep Heart Health Study second examination, who completed the SF-36, FOSQ, and SAQLI, and in-home polysomnograms, were included. The apnea hypopnea index (AHI) at 4% desaturation was categorized as no OSA (<5 /hour), mild to moderate OSA (5-30 /hour) and severe OSA (>30 /hour). QoL scores for each questionnaire were determined and compared by OSA severity category and by gender.
Results: Participants were 47.6% male, 49.2% (n=435) had no OSA, 43.2% (n=382) had mild to moderate OSA, and 7.6% (n=67) had severe OSA. Participants with severe OSA were significantly older (mean age = 63.7 years, p <.0001), had higher BMI (mean = 34.3 kg/m^2, p <.0001) and had lower SF-36 Physical Component scores (PCS) (45.1) than participants with no OSA (48.5) or those with mild to moderate OSA (46.5, p= .006). When analyzed according to gender, no significant differences were found in males for QoL by OSA severity categories. However, females with severe OSA had significantly lower mean scores for the SAQLI (5.4, p= .006), FOSQ (10.9, p= .02), and SF-36 PCS (37.7, p<.0001) compared to females with no OSA (6.0, 11.5, 44.6) and those with mild to moderate OSA (5.9, 11.4, 48, respectively). Females with severe OSA also had significantly higher mean BMI (41.8 kg/m^2,) than females with no OSA (26.5 kg/m^2) or females with mild to moderate OSA (30.6 kg/m^2, p<.0001). The SF-36 PCS and Mental Component Scores (MCS) were correlated with the FOSQ and SAQLI (r=.37 PCS vs FOSQ; r=.31 MCS vs FOSQ; r=.42 PCS vs SAQLI; r=.52 MCS vs SAQLI; and r=.66 FOSQ vs SAQLI, p<.001 for all correlations). Linear regression analyses, adjusting for potential confounders, indicated that the impact of OSA severity on QoL is largely explained by the presence of daytime sleepiness.
Conclusion: The impact of OSA on QoL differs between genders with a larger effect on females and is largely explained by the presence of daytime sleepiness. Correlations

among QoL instruments are not high and various instruments may assess different aspects of QoL.

Introduction

Obstructive sleep apnea (OSA) is a highly prevalent condition occurring in as many as 17% and 9% of middle aged males and females, respectively (1). OSA is now recognized as an important risk factor for the development of hypertension and coronary heart disease as well as premature death (2). However, patients frequently present to health care providers with symptoms that are indicative of impairment in their quality of life (QoL). Improvement in QoL is an important determinant of whether patients adhere to continuous positive airway pressure (CPAP), the most commonly prescribed treatment for OSA. Additionally, measurement of QoL is one of the quality metrics recently developed for use in clinical practice (3) thus increasing the importance of evaluating tools used to assess QoL in OSA.

A variety of tools to measure QoL have been utilized in epidemiologic studies and clinical trials of OSA. The most common general QoL instrument used has been the Medical Outcomes Study Short-Form Health Survey SF-36 (4). More recently, two sleep specific QoL questionnaires have been developed, the Functional Outcomes of Sleep Questionnaire (FOSQ) (5) and the Sleep Apnea Quality of Life Inventory (SAQLI) (6). Whether these sleep specific QoL instruments are more sensitive in those with OSA than general QoL questionnaires is not clear. Furthermore, there have been few comparisons of the FOSQ to the SAQLI with respect to their sensitivity in those with OSA and whether QoL differs between males and females. Using data from a large cohort study, the purposes of these analyses were to compare these instruments to each other, to assess whether they were able to detect differences in QoL among groups with different severities of OSA and to determine whether there were differences between genders.

Methods

The Sleep Heart Health Study (SHHS) is a prospective multicenter cohort study designed to investigate the relationship between OSA and cardiovascular diseases in the United States. Details of the study design have been published elsewhere (7). Briefly, initial baseline recruitment began in 1995, enrolling 6,441 subjects, 40 years of age and older, from several ongoing geographically distinct cardiovascular and respiratory disease cohorts who were initially assembled between 1976 and 1995 (8). These cohorts included the Offspring Cohort and the Omni Cohort of the Framingham Heart Study in Massachusetts; the Hagerstown, MD, and Minneapolis, MN, sites of the Atherosclerosis Risk in Communities Study; the Hagerstown, MD, Pittsburgh, PA, and Sacramento, CA, sites of the Cardiovascular Health Study; 3 hypertension cohorts (Clinic, Worksite, and Menopause) in New York City; the Tucson Epidemiologic Study of Airways Obstructive Diseases and the Health and Environment Study; and the Strong Heart Study of American Indians in Oklahoma, Arizona, North Dakota, and South Dakota. A SHHS follow-up examination took place between February 2000 and May

2003, enrolling 4,586 of the original participants who had a repeat polysomnogram in addition to completing questionnaires and undergoing other measurements. The present study focused on 884 participants from the Tucson and Framingham sites of the Sleep Heart Health Study second examination in whom data were available from the sleep habits questionnaire, all quality of life questionnaires, and in-home polysomnograms. Data was limited to these sites because administration of the FOSQ was not done at the other field centers.
The SHHS was approved by the respective institutional review boards for human subjects research, and informed written consent was obtained from all subjects at the time of their enrollment into each stage of the study.

Polysomnography
Participants underwent overnight in-home polysomnograms using the Compumedics Portable PS-2 System (Abbottsville, Victoria, Australia) administered by trained technicians (9). Briefly, after a home visit was scheduled, the Sleep Health Questionnaire, SF-36, SAQLI, and FOSQ questionnaires generally were mailed 1 to 2 weeks prior to the in-home polysomnography appointment. Each participant was asked to complete the questionnaire before the home visit, at which time the questionnaires were collected and verified for completeness. The home visits were performed by two-person, mixed-sex teams in visits that lasted 1.5 to 2 hours. There was emphasis on making the night of the polysomnographic assessment as representative as possible of a usual night of sleep. Participants were asked to schedule the visit so that it would occur approximately two hours prior to their usual bedtime. Participants' weekday or weekend bedtime routines were encouraged to be consistent with the day of the week that the visits were made.

The SHHS recording montage consisted of electroencephalogram (C4/A1 and C3/A2), right and left electrooculogram, a bipolar submental electromyogram, thoracic and abdominal excursions (inductive plethysmography bands), airflow (detected by a nasal-oral thermocouple [Protec, Woodinville, WA]), oximetry (finger pulse oximetry [Nonin, Minneapolis, MN]), electrocardiogram and heart rate (using a bipolar electrocardiogram lead), body position (using a mercury gauge sensor), and ambient light (on/off, by a light sensor secured to the recording garment). Sensors were placed, and equipment was calibrated during an evening home visit by a certified technician. After technicians retrieved the equipment, the data, stored in real time on PCMCIA cards, were downloaded to the computers of each respective clinical site, locally reviewed, and forwarded to a central reading center (Case Western Reserve University, Cleveland, OH). Comprehensive descriptions of polysomnography scoring and quality-assurance procedures have been previously published (9, 10). In brief, sleep was scored according to guidelines developed by Rechtschaffen and Kales (11, 12). Strict protocols were maintained to ensure comparability among centers and technicians. Intra-scorer and inter-scorer reliabilities were high (10). As in previous analyses of SHHS data, an apnea was defined as a complete or almost complete cessation of airflow, as measured by the amplitude of the thermocouple signal, lasting at least 10 seconds. Hypopneas were identified if the amplitude of a measure of flow or volume (detected by the thermocouple or thorax or abdominal inductance band signals) was reduced discernibly (at least 25%

lower than baseline breathing) for at least 10 seconds and did not meet the criteria for apnea. For this study, only apneas or hypopneas associated with a 4% or greater oxyhemoglobin desaturation were considered in the calculation of the apnea hypopnea index (AHI, apneas plus hypopneas per hour of total sleep time).

Sleep Habits Questionnaire and Covariates

Participants completed the SHHS Sleep Habits Questionnaire (13). The Sleep Habits Questionnaire contained questions regarding sleep habits. Height and weight were measured directly to determine body mass index (BMI, kg/m2). Sex and ethnicity were derived from data obtained from the SHHS parent cohorts. Participants answered yes or no to having a healthcare provider diagnosing them as having chronic obstructive pulmonary disease (COPD), chronic bronchitis, or asthma.

Sleepiness

The level of daytime sleepiness was determined using the Epworth Sleepiness Scale (ESS), a validated 8-item questionnaire that measures subjective sleepiness (14). Subjects were asked to rate how likely they are to fall asleep in different situations. Each question was answered on a scale of 0 to 3. ESS values ranged from 0 (unlikely to fall asleep in any situation) to 24 (high chance of falling asleep in all 8 situations). Mean ESS scores between 14 and 16 have been reported for patients with OSA (14, 15). Scores of 11 or greater are considered to represent an abnormal degree of daytime sleepiness (16). Sleepiness was defined as an ESS of at least 10.

Quality of Life Measures

Medical Outcomes Study Short-Form Health Survey (SF-36). Quality of life was evaluated using the Medical Outcomes Study Short-Form Health survey (SF-36) (4). The SF-36 is a multipurpose self-administered health survey consisting of 36 questions divided into 8 individual domains: (1) physical functioning (limitations in physical activity because of health problems), (2) role physical (limitations in usual role activities because of physical health problems), (3) bodily pain, (4) general health perceptions; (5) vitality (energy and fatigue), (6) social functioning (limitation in social activities because of physical or emotional problems), (7) role emotional (limitation in usual role activities because of emotional problems), and (8) general mental health. In addition, the 8 scales are used to form 2 distinct high-order summary scales: the physical component summary (PCS) and the mental component summary (MCS) (17). The PCS includes the physical functioning, role physical, bodily pain, and general health scales, and the MCS includes the vitality, social functioning, role emotional, and general mental health scales. The raw scores for each subscale and the 2 summary measures are standardized, weighted, and scored according to specific algorithms. The scores for the multifunction item scales and the summary measures range from 0 to 100, with higher scores indicating better quality of life. For the present study, we use only the PCS and MCS scales.

Functional Outcomes Sleep Questionnaire (FOSQ). The FOSQ was developed as a self-report instrument to assess the disorders of sleepiness on quality of life. It consists of 30 items with 5 factor-based subscales: activity level, vigilance, intimacy and sexual

relationships, general productivity and social outcome. A mean weighted item score is obtained for each subscale. The subscales are summed to produce a global score (5). In SHHS, questions related to sexual intimacy were omitted because there were concerns that some participants would find these embarrassing or offensive.

Sleep Apnea Quality of Life Index (SAQLI). The SAQLI was developed as a sleep apnea specific quality of life instrument (6). It is a 35 item instrument that captures the adverse impact of sleep apnea on 4 domains: daily functioning, social interactions, emotional functioning, and symptoms. Items are scored on a 7-point scale with "all of the time" and "not at all" being the most extreme responses. Item and domain scores are averaged to yield a composite total score between 1 and 7. Higher scores represent better quality of life. In SHHS, the short form of the SAQLI was administered, because it allowed for self-completion by the participants (18).

Statistical Analysis

Differences in proportions for descriptive characteristics between OSA severity categories, and categorical variables were analyzed using Chi-square tests with 2 degrees of freedom. Fisher's exact test was used when the expected frequency was less than 5 in any cell. One-way analyses of variance (ANOVA) were used to compare differences in mean values for continuous variables (BMI, total sleep time, SAQLI, FOSQ, SF-36 MCS, and SF-36 PCS) by OSA severity categories and by these categories separately for males and females. Pearson's correlations were used to test for correlation coefficients between the four quality of life scales, SAQLI, FOSQ, SF-36 MCS, and SF-36 PCS.

Separate multivariate linear regression models were fitted to evaluate scores from each of the four QoL scales by OSA categories for males and females. Potential confounders (age, race, COPD, chronic bronchitis, ESS and asthma) were evaluated and adjusted for in the models; only those variables with significant coefficients were kept in the models. Thus, OSA severity, ESS, and asthma were the only variables retained in the final models. All statistical tests were performed using statistical software (Stata SE, version 13.0 for Windows; Stata Corp; College Station, TX) and a significance level of 0.05.

Results

Participants were 47.6% male and 52.4% female, 49.2% (n=435) had no OSA, 43.2% (n=382) had mild to moderate OSA, and 7.6% (n=67) had severe OSA. Approximately 21% of participants with mild to moderate OSA and 39% of those with severe OSA reported excessive daytime sleepiness (ESS >10) (Table 1).

Table 1. Descriptive characteristics.*					
	Total	No OSA	Mild-Moderate OSA	Severe OSA	p-value
	N (%)	N (%)	N (%)	N (%)	
Gender					
Male	421 (47.6)	159 (36.6)	211 (55.2)	51 (76.1)	
Female	463 (52.4)	276 (63.4)	171 (44.8)	16 (23.9)	<.0001
Race					
White	753 (85.2)	368 (84.6)	326 (85.3)	59 (88.0)	
Black	53 (6)	31 (7.1)	19 (5.0)	3 (4.5)	
Hispanic	52 (5.8))	19 (4.4)	28 (7.3)	5 (7.5)	
Other	26 (3)	17 (3.9)	9 (2.4)	0	.18†
ESS					
≤ 10	711 (80.4)	367 (84.4)	303 (79.3)	41 (61.2)	
> 10	173 (19.6)	68 (15.6)	79 (20.7)	26 (38.8)	<.0001
COPD					
No	868 (98.7)	425 (98.1)	376 (99.2)	67 (100)	
Yes	11 (1.3)	8 (1.8)	3 (.8)	0	.37†
Chronic bronchitis					
No	841 (95.8)	418 (96.5)	358 (94.7)	65 (97.0)	
Yes	37 (4.2)	15 (3.5)	20 (5.3)	2 (3.0)	.38
Asthma					
No	758 (86.2)	373 (86.3)	330 (86.8)	55 (82.1)	
Yes	121 (13.4)	59 (13.7)	50 (13.2)	12 (17.9)	.58
*p-value for Chi-square test for gender, ESS, chronic bronchitis, and asthma by OSA category. †Fisher's exact test for race and COPD.					

Participants with severe OSA were significantly older (mean age = 63.7 years, p <.0001), had higher BMI (mean = 34.3 kg/m^2, p <.0001) and had lower SF-36 PCS scores (45.1, p= .006) than participants with no OSA or those with mild to moderate OSA. There was also a trend towards lower scores on the MCS of the SF-36, the SAQLI, and the FOSQ (Table 2).

Table 2. Descriptive characteristics by OSA categories.*					
	Total	No OSA	Mild-Moderate OSA	Severe OSA	
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	
Age (years)	61.6 (10)	59.5 (9.6)	63.2 (9.5)	63.7 (10.3)	
BMI (kg/m^2)	28.6 (5.7)	26.7 (4.4)	29.9 (5.6)	34.3 (7.8)	
Total sleep time†	384.5 (64.7)	386.9 (63.0)	383.4 (67.7)	374.1 (57.4)	
SAQLI	6.0 (.82)	6.0 (.78)	6.0 (.83)	5.8 (.8)	
FOSQ	11.5 (.82)	11.5 (.78)	11.5 (.84)	11.4 (.91)	
SF-36 MCS	54.0 (8.2)	53.8 (8.0)	54.4 (8.4)	55.3 (7.4)	
SF-36 PCS	47.1 (10.8)	48.5 (10.5)	46.5 (11.0)	45.1 (10.3)	
* p-value for ANOVA test for each descriptive variables by OSA category. †Time in minutes.					

When analyzed according to gender, no significant differences were found in males for QoL by OSA severity categories (Table 3).

Table 3. Descriptive characteristics for QoL questionnaires by OSA categories for males.*				
	No OSA	Mild-Moderate OSA	Severe OSA	p-value
	Mean (SD)	Mean (SD)	Mean (SD)	
BMI (kg/m^2)	27.0 (3.5)	29.5 (4.2)	31.9 (5.0)	<.0001
Total sleep time†	377.0 (59.6)	370.4 (68.3)	371.4 (56.8)	.60
SAQLI	6.0 (.73)	6.0 (.8)	5.9 (.7)	.69
FOSQ	11.6 (.7)	11.5 (.86)	11.6 (.82)	.72
SF-36 MCS	53.8 (8.1)	54.7 (7.9)	55.7 (7.0)	.25
SF-36 PCS	49.3 (9.4)	48.0 (10.3)	47.4 (8.9)	.33
*p-value for ANOVA test.				

Males with severe OSA had significantly higher BMI (mean 31.9, p<.0001) than males with no OSA or males with mild to moderate OSA. However, as shown in Table 4, females with severe OSA had significantly lower mean scores for the SAQLI (5.4, p= .006), FOSQ (10.9, p= .02), and SF-36 PCS (37.7, p<.0001) compared to females with no OSA and those with mild to moderate OSA.

Table 4. Descriptive characteristics for QoL questionnaires by OSA categories for females.*				
	No OSA	Mild-Moderate OSA	Severe OSA	p-value
	Mean (SD)	Mean (SD)	Mean (SD)	
BMI (kg/m^2)	26.5 (4.7)	30.6 (6.9)	41.8 (9.9)	<.0001
Total sleep time†	392 (64.3)	399.5 (63.6)	382.6 (60.3)	.41
SAQLI	6.0 (.8)	5.9 (.86)	5.4 (.97)	.006
FOSQ	11.5 (.82)	11.4 (.8)	10.9 (1.03)	.02
SF-36 MCS	53.8 (7.9)	53.9 (8.9)	53.8 (8.3)	.99
SF-36 PCS	48.0 (11.0)	44.6 (11.6)	37.7 (11.1)	<.0001
*p-value for ANOVA test.				

Females with severe OSA also had significantly higher BMI (mean 41.8, p<.0001) than females with no OSA or females with mild to moderate OSA.

As shown in Table 5, comparisons between the QoL measures showed small correlations between the FOSQ and the SF-36 MCS (r=.31, p < .001) and the SF-36 PCS (r=.37, p <.001), and medium correlations between the SAQLI and the SF-36 MCS (r=0.52, p <.001) and the SF-36 PCS (r=.42, p < .001).

Table 5. Correlation for SAQLI, FOSQ, SF-36 MCS, and SF-36 PCS.*

	SAQLI	FOSQ	SF-36 MCS	SF-36 PCS
SAQLI	1			
FOSQ	0.66 (<0.001)	1		
SF-36 MCS	0.52 (<0.001)	0.31 (<0.001)	1	
SF-36 PCS	0.42 (<0.001)	0.37 (<0.001)	-0.024 (0.142)	1

* r (p-value) for Pearson correlation

The correlation between the SAQLI and FOSQ was 0.66, p <.001, and the correlation between SF-36 MCS and SF-36 PCS was -.024, however this was not significant (p = .142). In addition, ESS scores were inversely correlated with the SAQLI (r = -.36), FOSQ (r = -.43), MCS (r = -.17), and PCS (r = -.16) (data not shown).
Because categorical analyses showed no difference for males in QoL scores, we, therefore, ran linear regression models separately for females and males (Table 6).

Table 6. Linear Regression models predicting QoL scores by OSA category for females and males.

	Female			Male		
	Coefficient	p-value	95% CI	Coefficient	p-value	95% CI*
SAQLI						
Mild-Moderate OSA	.02	.72	-.12 – .17	.03	.69	-.12 – .18
Severe OSA	-.35	.07	-.73 – .03	-.002	.98	-.23 – .23
Asthma	-.25	.01	-.44 – -.05	-.19	.08	-.41 – .03
ESS	-.08	<.0001	-.09 – -.06	-.04	<.0001	-.06 – -.03
Constant	6.6	<.0001	6.4 – 6.7	6.4	<.0001	6.2 – 6.6
FOSQ						
Mild-Moderate OSA	.03	.66	-.11 - .17	-.03	.63	-.19 – .11

In these analyses, AHI severity was significant only for the SF-36 PCS in females with severe OSA. (coeff. = 8.3, p=.004). In contrast, the ESS was significant in models for all of the instruments in both males and females. The only other factor entering into some models was asthma, which was significant in models of the SAQLI and the PCS in females.

Discussion

In these analyses using a general (SF-36) and two sleep specific QoL assessment tools (FOSQ and SAQLI), we found that QoL was reduced in those with severe OSA; substantial differences were not apparent among participants with mild to moderate OSA and those with no OSA. However, there were significant gender disparities. Females with severe OSA demonstrated a substantial reduction in QoL with all instruments, but there was a lack of differences among males by OSA severity. The reductions in QoL were explained primarily by the presence of sleepiness. Furthermore, correlations among QoL questionnaires were modest at best, indicating that they assess different QoL domains.

When males and females were analyzed together in our study, only the PCS of the SF-36 showed a significant reduction in QoL in participants with OSA, but this was limited solely to participants with severe OSA. Additional studies also have found lower QoL only in those with severe OSA (19, 20). Moreover, other studies have failed to find any differences in QoL among participants with a broad spectrum of OSA severity (21-23). In one of these studies, Lee and colleagues (22) found that the AHI was not associated with differences in the PCS or MCS of the SF-36 in a large group of patients seen in a sleep clinic. In their study, other factors, such as age, gender, minimum oxygen saturation, sleepiness, and depression were associated with the PCS or MCS scores. Our study also found a strong trend between sleepiness and QoL scores for females and males. Similarly, in a smaller study, Lee et al. (22) did not find differences in the SAQLI among OSA patients of different severities. Our data also are consistent with a previous analysis from the first examination of SHHS in which severe OSA was associated with worse QoL on most subscales of the SF-36, but only the vitality subscale was reflective of poorer QoL in participants with OSA of less severity. In contrast, even mild OSA was associated with reduced QoL in comparison to no OSA among the middle-aged males and females of the Wisconsin Sleep Cohort (24). However, our cohort was older than participants in the Wisconsin Sleep Cohort and only a small sample from the SHHS was analyzed in the present study. Thus, age and other demographic differences among the cohorts may provide explanations for these discrepancies. Nevertheless, despite the absence of large cross-sectional differences in QoL as a function of OSA severity, in most studies, the SF-36, SAQLI, and FOSQ have been shown to be sensitive to changes in QoL after OSA treatment.

When analysis of our data was performed separately according to gender, we observed that the reduction in QoL with severe OSA was limited to females irrespective of the QoL instrument. Other studies (22) also have noted that QoL in participants with OSA is worse in women. However, in a study of a large cohort of males, Appleton et al.,(25) found that increasing AHI was associated with lower QoL on the SF-36, but only in those less than 69 years of age. The median age of the SHHS cohort is 60 years with substantial numbers of participants older than 70 years. Thus, our results and those of Appleton et al. (25) may not be discrepant necessarily.

Excessive daytime sleepiness is one of the most common symptoms in OSA, and sleepiness can have a profound negative impact on QoL. Thus, not surprisingly, our

multivariate analyses demonstrated that the negative impact of severe OSA was explained primarily by the presence of sleepiness. Our finding is consistent with the findings of some, (19, 22, 23, 26) but not all previous studies (27). The explanation for these inconsistent findings is not readily apparent, but possibilities include whether study populations were recruited from the general population or clinic, as well as whether the cohorts had other co-morbidities that would impact QoL. A differential perception of sleepiness between males and females offers a possible explanation of the greater impact of OSA on QoL in the latter. However, this assertion seems unlikely inasmuch as previous studies indicate females with OSA are more likely to report fatigue rather than sleepiness (28-30).

We observed that correlations among the SF-36, SAQLI, and FOSQ were relatively weak to moderate. Our results are consistent with the few studies that have done similar comparisons. In a Spanish multicenter study (21), correlations of the FOSQ and several scales of the SF-36 with the 4 domains of the SAQLI were poor to moderate. They ranged from r=.179 between the FOSQ and SAQLI Emotional Functioning domain to r=.579 for the SF-36 Vitality and SAQLI Daily Functioning domain. In a Polish study (31), the correlation between the SF-36 and the FOSQ was r=.46 and between the SF-36 and the SAQLI was r=.47. Other studies have compared the SF-36 to other general QoL instruments in patients with OSA, with some, but not all, demonstrating reasonable correspondence (32, 33). Considering our results with other studies, various instruments may sample different aspects of QoL. Care should be exercised when selecting a tool to assess health outcomes in OSA.

There are several important limitations to our findings. First, the SHHS cohort was recruited from participants enrolled in other longitudinal studies, many of whom were long-time participants. These individuals may represent a group of survivors who would generally have better QoL regardless of OSA-severity status. Second, as a group, the SHHS cohort is older (mean age = 61.6 years) and may not be representative of the US adult population. Third, SHHS is a general population cohort, and thus, unlike a clinical cohort, some did not have symptoms of OSA. Finally, severity of OSA may not be best reflected by the AHI. Other markers of severity such as amount of oxygen desaturation or degree of sleep fragmentation may be better surrogates to show differences in QoL. Nevertheless, despite these limitations, our analyses have some unique qualities such as a well-characterized, racially and ethnically diverse cohort, use of home-based polysomnography to assess the severity of OSA, and data related to QoL derived from 3 different instruments.

In conclusion, in a middle-aged to elderly cohort, QoL is poorer only in females with severe OSA. To a large extent, these findings can be explained by the presence of daytime sleepiness. Correlations among 3 commonly used QoL instruments used in persons with OSA were weak to moderate, suggesting that each samples different aspects of QoL. Therefore, care should be exercised in selecting a QoL tool for documenting health care outcomes for research or clinical care.

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