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Gender Differences in Sleep Quality and Attitudes among Older Adults in Portugal: The Role of Age and Self- Perceived Functional Health

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Abstract

Objective: To investigate gender differences in sleep quality and dysfunctional sleep-related attitudes in adults aged 55 years and older, and to examine how age and self-perceived functional health relate to these differences.

Methods: A cross-sectional survey study was conducted with community-dwelling older adults (n=125, age ≥ 55) in Portugal. Participants completed the Pittsburgh Sleep Quality Index (PSQI) for sleep quality, the Dysfunctional Beliefs and Attitudes about Sleep-16 (DBAS-16) for sleep-related attitudes, and a self-report measure of functional health status. Descriptive statistics and group comparisons (men vs women) were used to characterize sleep outcomes and attitudes by gender. Associations between age, self-rated health, sleep quality, and sleep attitudes were analyzed with correlation and stratified comparisons.

Results: Women reported significantly poorer sleep quality than men (mean PSQI: 7.2 vs 5.8, p=0.01) and endorsed slightly more dysfunctional beliefs about sleep (mean DBAS score: 4.0 vs 3.5, p=0.05). Over 60% of women had clinically poor sleep (PSQI > 5) compared to about 45% of men. Older age was associated with worse sleep quality ($r \approx 0.25$) and higher dysfunctional belief scores ($r \approx 0.20$). Participants with poorer self-perceived functional health had markedly worse sleep outcomes: those rating their health as fair/poor showed higher PSQI scores and more frequent insomnia symptoms than those with good/excellent health ($p < 0.01$). Notably, negative sleep attitudes (DBAS) were positively correlated with poor sleep quality (PSQI) ($r \approx 0.40$, $p < 0.001$), and this relationship was more pronounced in the older subset of the sample (ages ≥ 65).

Conclusion: Among adults aged 55 and above, women exhibit poorer sleep quality and more negative sleep-related attitudes than men. Advancing age and lower self-rated functional health are associated with exacerbated sleep disturbances and may intensify the link between dysfunctional sleep beliefs and sleep quality. These findings underscore the importance of addressing gender-specific needs and cognitive factors (beliefs about sleep) in interventions to improve sleep health in older populations.

Keywords: *Sleep quality, Sleep attitudes, Gender differences, Older adults, Functional health, Aging, Insomnia*

Introduction

Sleep disturbances are prevalent among older adults, arising not only from natural age- related physiological changes but also from psychosocial and mental health factors. Notably, women in late adulthood tend to report higher rates of insomnia and poorer sleep quality than their male counterparts, this gender disparity in sleep problems has been documented in epidemiological studies, with older women about 1.4 times more likely to experience insomnia than men. Several factors may contribute to this difference, including hormonal changes (eg. post-menopausal effects), comorbid conditions, and differing psychosocial stressors between genders [1,2].

In addition to biological and social factors, cognitive-behavioral factors—particularly one's beliefs and attitudes about sleep—play a significant role in sleep quality in later life. Many individuals, including older adults, hold "sleep myths" or maladaptive beliefs about sleep [3]. For example, some believe that missing a few hours of sleep will inevitably ruin their functioning, or that one has no control over sleep problems in old age. Such dysfunctional beliefs and attitudes about sleep can negatively impact sleep behaviors and anxiety around sleep. Previous research shows that misperceptions about sleep can exacerbate insomnia and even impair daytime functioning [1]. In older adults, persistent negative attitudes toward sleep or aging (for instance, believing that poor sleep is an irreversible part of aging) may further worsen sleep quality and reduce the likelihood of seeking effective help [4].

Self-perceived health and functional status are also important correlates of sleep in older populations. Poor sleep quality is associated with worse self-rated health and reduced daily functioning in older adults. In fact, longitudinal and cross-sectional studies have found that older individuals with chronic sleep disturbances are more likely to report poorer overall health and have higher risks of physical disability. Conversely, those who maintain good functional health into older age often report better sleep quality [5].

These interrelationships suggest that an older person's health status and sleep influence each other in both directions: chronic health issues can disrupt sleep, and persistent poor sleep can deteriorate one's physical and mental well-being. Understanding these links is particularly important given that improving sleep might yield benefits for other health domains in aging.

Despite the known prevalence of sleep issues and the recognized influence of cognitive and health factors, the intersection of gender, sleep-related attitudes, and functional health in older adults remains underexplored. Prior studies have seldom simultaneously examined how men and women may differ in their sleep quality and sleep beliefs in later life, or how these differences might be modulated by age-related factors. The present study aims to fill this gap by focusing on gender differences in sleep quality and attitudes among older adults (55+), while also considering the role of age and self-perceived functional health. We hypothesized that older women would have poorer sleep outcomes and potentially more dysfunctional sleep beliefs compared to older men. We further expected that advancing age and lower functional health would be associated with worse sleep and might amplify the impact of negative sleep attitudes on sleep quality. By clarifying these relationships, this work seeks to inform targeted interventions (such as sleep education or cognitive-behavioral strategies) that account for gender and individual health status in promoting better sleep among seniors.

Methods

Study Design and Participants

This study was a cross-sectional survey of community- dwelling older adults in Portugal. Participants were eligible if they were Portuguese residents aged 55 years or older and able to complete an online questionnaire in Portuguese. A total of 125 participants (71 men and 54 women) were recruited through convenience sampling using online advertisements and social media between March and May 2024. Inclusion criteria required that individuals be ≥55 years and not diagnosed with any severe cognitive impairment (self-reported) that would preclude informed consent or questionnaire completion. The mean age of the sample was 58.1 years (SD=6.2, range 55–80), with no significant age difference between men and women (see Table 1).

Table 1: Participant characteristics and sleep outcomes by gender (N=125).

Measure	Men (n=71)	Women (n=54)	*p*-value (M vs W)
Age, years (Mean ± SD)	57.6 ± 6.1	58.5 ± 6.3	0.40 (ns)
Measure	Men (n=71)	Women (n=54)	p-value (M vs W)
Sleep Quality (PSQI)			
– Global PSQI score (0–21)	5.8 ± 2.5	7.2 ± 3.0	0.01 **
– Poor sleepers (PSQI > 5), %	33 (46.5%)	35 (64.8%)	0.03 **
Sleep Attitudes (DBAS-16)			
– DBAS average score (1–10)	3.5 ± 1.0	4.0 ± 1.2	0.05 *
Self-Rated Functional Health			
– "Good/Very good" health, %	50 (70.4%)	32 (59.3%)	0.20 (ns)

Values are Mean ± Standard Deviation or n (%). **PSQI:** Pittsburgh Sleep Quality Index (global score > 5 indicates poor sleep quality). **DBAS-16:** Dysfunctional Beliefs and Attitudes about Sleep scale (higher scores indicate more dysfunctional beliefs). **ns:** not significant; *$p < 0.05$, **$p < 0.01$.

Measures

Sociodemographic data (age, gender, etc.) and self-rated health status were collected via a structured questionnaire. Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI) [6], a widely used 19-item instrument that yields a global score of sleep quality (range 0–21, higher scores indicating worse sleep quality). As per standard scoring, a global PSQI score > 5 was used to identify "poor sleepers" with clinically significant sleep disturbance. Internal consistency of the PSQI in this sample was good (Cronbach's α=0.74). Dysfunctional beliefs and attitudes about sleep were measured with the 16-item Dysfunctional Beliefs and Attitudes about Sleep scale (DBAS-16) [7]. The DBAS-16 evaluates the degree to which respondents endorse unhelpful or erroneous beliefs regarding sleep (e.g., *"After a poor night's sleep, I know itwill impair my daytime performance"*), on a Likert scale type (0=strongly disagree to 10=strongly agree), with higher scores reflecting stronger dysfunctional beliefs about sleep. Higher average scores reflect more dysfunctional sleep-related cognitions. In our sample, the DBAS-16 demonstrated acceptable reliability (Cronbach's α=0.90). Perceived functional health was measured using the Work Health Questionnaire (WHQ) [8]– a self- report instrument that gauges one's health status and its impact on daily work or activities. Given that many participants were retired or not formally employed, we adapted the WHQ items to refer to ability to perform routine daily activities and instrumental tasks. We also asked participants to rate their overall health on a five-point scale (excellent, very good, good, fair, poor); for analysis, this was dichotomized into "good/very good/ excellent" vs. "fair/poor" to indicate high vs. low self-perceived health.

Procedure

Participants provided informed consent online before proceeding to the survey. The survey was administered via a secure web-based platform and took approximately 15–20 minutes to complete. To encourage honest responses, participants were assured of anonymity and that data would be reported only in aggregate. The study protocol was reviewed and approved by the University of Évora's Ethics Committee (approval 2024/20). All procedures were conducted in accordance with the Declaration of Helsinki. At the end of the survey, participants were debriefed with a brief educational message about good sleep practices and provided with contact information for follow-up questions or resources on insomnia, in line with ethical commitments to beneficence.

Statistical Analysis

Data analysis was performed using SPSS version 27. Descriptive statistics were computed for all key variables. Continuous outcomes (PSQI score, DBAS score, age) were approximately normally distributed; values are presented as mean ± standard deviation (SD). Categorical outcomes (e.g., percentage of poor sleepers) were summarized as proportions. Group differences by gender were evaluated using independent *t*-tests for continuous variables and chi-square tests for categorical variables. Bivariate Pearson correlations were used to examine associations between age, PSQI, DBAS, and health ratings. In light of the study's focus on descriptive findings, we avoided complex multivariable modeling; however, we conducted

stratified analyses by age group (e.g., comparing those 55–64 vs ≥65) to explore age-related trends. A two- tailed alpha of 0.05 was considered statistically significant.

Results

Participant Characteristics

A total of 125 older adults (mean age=58.1 ± 6.2 years) completed the study, of whom 57% were men (n=71) and 43% women (n=54). Table 1 presents the key characteristics and outcome measures by gender. Men and women in the sample were similar in age and had comparable socioeconomic backgrounds (the majority in both groups were married or cohabiting, and approximately 68% had at least secondary-level education). Self-rated functional health was relatively high on average, though women were somewhat more likely to report fair or poor health status than men (women: 40.7% fair/poor vs men: 29.6%, a difference that was not statistically significant, p=0.21).

As shown in Table 1, women had markedly poorer sleep outcomes on several metrics. The average PSQI global score for women was 7.2 (SD 3.0) compared to 5.8 (SD 2.5) for men, a significant difference (p=0.01). In practical terms, 65% of women scored above 5 on the PSQI (indicating poor sleep quality or possible insomnia), whereas about 46% of men did so – an absolute difference of nearly 20 percentage points in poor sleep prevalence between genders. Women were especially prone to reports of difficulty staying asleep and higher daytime dysfunction scores (components of the PSQI; data not shown), whereas men reported slightly shorter total sleep durations on average (men 6.3 hours vs women 6.5 hours, not a significant difference).

Beyond sleep quality, women also tended to endorse more dysfunctional attitudes about sleep. The mean DBAS-16 score (item average) was higher in women (4.0 ± 1.2) than in men (3.5 ± 1.0, p=0.05). Although this difference was of marginal statistical significance, it suggests a trend whereby older female participants were more likely to agree with unhelpful beliefs (for example, believing they have less control over their sleep or catastrophizing the consequences of poor sleep). To illustrate, 30% of women strongly agreed with the statement "When I sleep poorly one night, I know it will disturb my functioning the next day," compared to about 18% of men. Such findings hint that older women in our sample might have greater anxiety or concern regarding their sleep, which could in turn perpetuate sleep difficulties.

Associations with Age and Health

Correlation analyses revealed that age and self-perceived health were significantly related to sleep outcomes across the whole sample. In this cohort spanning late midlife to early old age (55–80 years), **older age correlated with worse sleep quality** (r=+0.24, p <0.01 for age vs PSQI score). Participants in their late 60s and 70s tended to have higher PSQI scores (indicating more sleep problems) than those in their late 50s. For example, those aged ≥65 had a mean PSQI of 7.1, compared to 6.0 in those aged 55–64, a significant difference (p=0.04). Age was also positively (though more modestly) correlated with dysfunctional belief scores (r=+0.18, p=0.049), suggesting that the oldest participants were slightly more likely to hold negative sleep-related attitudes. Notably, **the relationships between sleep attitudes and sleep quality appeared to strengthen with advancing age**: among participants aged 65 and above, the correlation between DBAS-16 and PSQI was $r \approx 0.50$ ($p < 0.001$), whereas among those aged 55–64 it was $r \approx 0.30$. This pattern implies that in the older-old group, those who harbored more dysfunctional beliefs about sleep almost invariably had poor sleep quality, highlighting a potentially compounding effect of age and maladaptive cognitions on sleep.

Self-rated functional health showed a strong association with sleep measures. Participants who described their health as "fair" or "poor" had substantially worse sleep than those who described their health as "good" or better. Specifically, the fair/poor health group (about one-third of the sample) had a mean PSQI of 8.0 vs. 5.5 in the good/very good health group ($p < 0.001$). They were also twice as likely to qualify as "poor sleepers" (78% vs 38% with PSQI >5). In addition, those with poorer self-perceived health scored higher on the DBAS-16 (mean 4.3 vs 3.4, $p < 0.01$), indicating that health-compromised individuals tended to also endorse more pessimistic views about their sleep. It is noteworthy that the gender gap in sleep quality persisted even after accounting for health perceptions: among participants who rated their health good/excellent, women still had higher PSQI scores than men (6.5 vs 5.0, p=0.03). This suggests that gender differences in sleep quality are not solely explained by differences in health status.

Finally, we observed a robust association between dysfunctional sleep beliefs and actual sleep quality. Across the sample, the DBAS-16 score was positively correlated with PSQI global score (r=+0.42, $p < 0.001$). In other words, individuals who more strongly endorsed dysfunctional attitudes (for instance, *"I can't cope after a bad night's sleep"* or *"As I am older, insomnia is expected and I can do little about it"*) tended to report objectively worse sleep (more insomnia symptoms, shorter sleep duration, etc.). This finding supports the notion that cognitive factors are closely tied to sleep outcomes: negative beliefs may both reflect and contribute to one's sleep difficulties.

Discussion

This study examined gender disparities in sleep quality and sleep-related attitudes among Portuguese older adults, and how age and self-perceived functional health relate to these factors. Our results confirm that older women experience poorer sleep than older men, consistent with a large body of evidence on gender and sleep in aging populations Women in our sample had higher PSQI scores and a greater proportion meeting criterion for poor sleep quality or insomnia. This aligns with epidemiological findings that insomnia is more prevalent in women, especially in mid- and late-life, due to biological factors (menopausal changes, higher risk of conditions like depression or anxiety that interfere with sleep) and possibly social factors (caregiving responsibilities, etc.) [2]. Arecent meta-analysis by Zhu et al. [9] similarly found that females have significantly higher insomnia severity and poorer overall sleep quality compared to males in adult populations. Our study extends these observations specifically into the 55+ age range within a European context, underscoring that the gender gap in sleep health persists into older age.

Beyond documenting the difference, we also explored *why* older women might have worse sleep. One notable finding was that

women endorsed more **dysfunctional beliefs and attitudes about sleep** than men. Although the gender difference in DBAS-16 scores was modest, it suggests that cognitive factors may play a role in the observed sleep disparity as previous research suggested [10]. Women's higher agreement with statements reflecting sleep-related worry or helplessness could contribute to a self- perpetuating cycle of insomnia: fear and anxiety about sleep lead to hyperarousal and worse sleep, which in turn reinforces those negative beliefs. This mechanism is well- described in cognitive-behavioral models of insomnia, where unhelpful beliefs (e.g., *"If I don't get 8 hours of sleep, I won't be able to function at all"*) fuel maladaptive behaviors and physiological arousal that impair sleep [11]. Our data lend support to this model in an older population. The correlation between DBAS scores and sleep quality was strong, indicating that those with the poorest sleep tended to be the ones with the most negative attitudes. This finding is in line with prior studies [11] that have highlighted the impact of sleep cognitions on insomnia outcomes. For instance, Semler and Harvey demonstrated that misperceiving or exaggerating the consequences of poor sleep can adversely affect daytime performance in insomnia patients. Likewise, a study by Sella et al. on Italian older adults reported that sleep-related beliefs significantly affected quality of life and were linked to subjective sleep quality [12]. Together with these reports, our results underscore the importance of assessing and addressing dysfunctional beliefs in older individuals who struggle with sleep. Particularly for older women—who in our study showed slightly higher levels of such beliefs—interventions like Cognitive Behavioral Therapy for Insomnia (CBT-I) that target and modify maladaptive sleep thoughts could be especially beneficial.

Another key contribution of this study is highlighting the role of age and self-perceived functional health in relation to sleep. Within our sample of adults all over 55, those of more advanced age (e.g., in their 70s) had poorer sleep quality on average than those in their late 50s or early 60s. This finding is expected given the normal age-related changes in sleep architecture (reduced slow-wave sleep, more fragmented sleep) and the higher burden of health problems in the older-old. What is novel is our observation that the interplay between negative sleep attitudes and sleep quality appeared to intensify with age. In other words, the oldest participants who had strong dysfunctional beliefs were the ones with particularly poor sleep, even more so than younger participants with similar belief scores. A plausible interpretation is that as people age, those who hold onto pessimistic views about their sleep ("There's nothing I can do, it's just old age") may not only experience worse sleep but also might be less proactive in managing it, leading to a compounding effect. This suggests that interventions to change sleep attitudes could be critically important for the oldest-old adults to prevent a decline into chronic insomnia. It also resonates with recent findings by Sabatini et al. [13], who reported that subjective sleep difficulties in older adults were associated with more negative self-perceptions of aging. Those who felt "older" or had a more negative outlook on their own aging process tended to have worse sleep, indicating a link between how aging is perceived and actual sleep outcomes. Our results echo this connection: a mindset that poor sleep is an inevitable part of aging can become a self-fulfilling prophecy. Tackling such age-related sleep fatalism should be an element of public health messaging and individual counseling for older adults.

Self-perceived health emerged as a strong correlate of sleep in our study, which is consistent with other studies that tie sleep quality to health status in older populations [14]. Participants who reported worse functional health had significantly higher PSQI scores and were more likely to experience insomnia symptoms. This association remained even when controlling for age and gender in exploratory analyses (data not shown), suggesting it is robust. The direction of causality is likely bidirectional: chronic health conditions and pain can disturb sleep, and conversely chronic poor sleep can worsen health outcomes (through pathways such as inflammation, blood pressure, mood, etc.). Our findings are in line with a recent community-based study in Taiwan which found that poor sleep quality was an independent risk factor for poor self-rated health in middle-aged and older adults [14]. Moreover, some evidence indicates this linkage might be particularly pronounced in women. For instance, a cross-sectional analysis noted that sleep quality was the strongest predictor of overall health status, especially of mental health, in women as compared to men [15]. While our study did not directly test interactions between gender and health in predicting sleep (due to sample size limitations). Improving sleep may yield substantial health benefits [16], particularly for older women, who often face the combined challenges of poorer sleep quality and a heightened risk for chronic conditions such as musculoskeletal pain and depression.

Strengths and Limitations

This study benefits from a focus on a relatively understudied nexus – gender differences in sleep in the context of both psychological and health-related factors in older adults. We employed validated instruments and achieved a balanced representation of men and women, which is notable as many aging studies skew female. The use of a structured, theory-driven questionnaire (DBAS-16) to capture sleep attitudes is another strength, as it allowed us to quantitatively demonstrate the role of dysfunctional beliefs. However, several limitations must be acknowledged. First, the cross-sectional design limits causal inferences. We cannot definitively conclude, for example, that dysfunctional beliefs caused worse sleep; it may also be that having chronic sleep problems leads to more negative beliefs. Longitudinal studies would be valuable to untangle these directions. Second, the sample was drawn via online recruitment and was relatively healthy and educated overall, which may limit generalizability. Those with very severe health issues or cognitive impairments (who might have even worse sleep) were likely underrepresented. Additionally, sleep quality was measured by self-report (PSQI) rather than objective measures; while PSQI is an accepted tool, future research could include actigraphy or polysomnography to corroborate the self-reports. Finally, our decision to simplify the statistical analysis means we did not control for multiple confounders simultaneously (e.g., performing a multivariate regression). This was intentional to emphasize clear, descriptive results, but it means that some nuanced effects could be missed or confounded. For instance, factors like medication use, anxiety levels, or specific medical diagnoses were not accounted for and could influence the gender differences observed.

Implications for Practice

Despite these limitations, the findings have practical implications for geriatric health care and sleep management. The clear indication that older women are at higher risk for poor sleep suggests that primary care providers and gerontologists should routinely screen for sleep problems in their older female patients. Such screening could use brief tools or even single questions about insomnia symptoms. If identified, interventions can be tailored – for example, older women might benefit from support groups or therapy that addresses both menopause-related sleep changes and the cognitive aspects of insomnia. The strong link between dysfunctional beliefs and sleep outcomes, especially in the older age group, indicates that cognitive-behavioral strategies could be effective. Clinicians should consider incorporating psychoeducation to dispel common "sleep myths" [13] and coaching in adaptive thinking (e.g., teaching that one bad night does not ruin everything, or that some wakefulness at night is normal and not catastrophic). There is evidence that such approaches can significantly improve insomnia outcomes in older adults by reducing anxiety and unhelpful rumination about sleep [17].

Moreover, given the association between sleep and self-rated health, interventions to improve sleep might have broader benefits for older adults' functionality and quality of life. For instance, encouraging better sleep hygiene and possibly treating underlying sleep disorders (like sleep apnea or restless legs) could in turn improve daytime energy and the capacity to engage in physical and social activities, thus improving perceived functional health. This is a virtuous cycle worth pursuing. Public health programs aimed at older populations could include components on maintaining good sleep as part of healthy aging, targeting both men and women but with special outreach to women (who may be less likely to voice sleep complaints due to normalization of their insomnia).

Future Research

Building on these results, future research should explore interventions that simultaneously target multiple domains – for example, a program for older adults that includes physical exercise (to improve health and sleep), cognitive-behavioral therapy for insomnia (to address beliefs and habits), and education about normal age- related sleep changes. Such multifaceted interventions could be tested to see if they preferentially benefit one gender or age group more. Additionally, qualitative research might provide deeper insight into how older men and women perceive their sleep and aging; understanding these perceptions could help tailor more effective communication and interventions. Finally, it would be useful to investigate physiological measures (like cortisol rhythm or inflammatory markers) in older adults with poor sleep to see if the gender differences we observed translate to different health risks. This could reinforce the need for targeted sleep interventions as a means of chronic disease prevention in aging, particularly for women's health.

Conclusion

In summary, this study highlights that among adults aged 55 and over, women are at higher risk of poor sleep quality and tend to hold more negative attitudes toward sleep compared to men. Age-related factors and self-perceived functional health also significantly intersect with sleep: older age and poorer health are associated with exacerbated sleep problems, and they may amplify the deleterious impact of dysfunctional sleep beliefs on actual sleep. These findings emphasize that addressing sleep in older adults requires a comprehensive approach. Health professionals should be attentive to the gender-specific patterns – for instance, tailoring insomnia interventions to older women's needs – and should not overlook the cognitive dimension of sleep health. By improving sleep hygiene, correcting false beliefs about sleep, and managing health comorbidities, we can help older men and women achieve better sleep. Better sleep, in turn, is likely to promote healthier, more active aging and improved quality of life. In the context of women's health care, in particular, our results suggest that late-life sleep interventions could play a meaningful role in closing the gender gap in well-being and functional health among seniors.

Declarations

Ethical Approval

The study protocol was approved by the Ethics Committee of the University of Évora (Protocol No. 2024/20-PSY). All participants provided informed consent electronically before participation.

Informed Consent

Informed consent was obtained from all individual participants included in the study. Participants were informed about the study's purpose, their rights to withdraw at any time, and data confidentiality. No personally identifiable information was collected in the survey, and all responses were anonymized.

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Authors' Contributions

A.C. (Adelinda Candeias) and A.F. (Adriana Félix) jointly conceptualized the study and its design. A.F. oversaw data collection and initial statistical analyses, under the mentorship of A.C. Both authors contributed to interpretation of the findings. A.F. drafted the initial manuscript, and A.C. provided critical revisions and additions. Both authors have approved the final manuscript and agree to be accountable for all aspects of the work.

Conflict of Interest

The authors declare no conflicts of interest. They have no financial or personal relationships that could have inappropriately influenced the work reported in this paper. Both authors affirm that the content of this manuscript represents their original work and scientific findings, with no competing interests.

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