Original Article / *Özgün Makale*

DOI: 10.4274/jtsm.galenos.2025.26937

J Turk Sleep Med *2025;12(3):176-185*

Workaholism and Sleep Disorders in Employees: The Moderator Roles of Workaholism in the Relationships between Insomnia and Affective Symptoms

Çalışanlarda İşkoliklik ve Uyku Bozuklukları: Uykusuzluk ve Afektif Belirtiler Arasındaki İlişkilerde İşkolikliğin Düzenleyici Rolü

Yağmur Nalbantoğlu[1], Kutlu Kağan Türkarslan[2]

[1]*Atılım University, Graduate School of Social Sciences, Department of Psychology, Ankara, Türkiye*
[2]*Ankara Medipol University, Faculty of Administrative and Social Sciences, Department of Psychology, Ankara, Türkiye*

Abstract

Objective: Sleep disorders are a growing concern in occupational health due to their strong associations with emotional distress and impaired functioning. Employees with severe insomnia symptoms are at increased risk for affective symptoms such as anxiety and depression. However, this relationship may vary depending on work-related behavioral patterns. Workaholism, a compulsive drive to work excessively, may act as a moderator, intensifying the impact of sleep disturbances on affective symptoms and vice versa. This study aimed to assess sleep disorder risk among employees, examine differences in the severity of sleep disorders based on workaholism levels, and investigate the moderating roles of workaholism in the relationships between insomnia severity and affective symptoms.

Materials and Methods: The sample consisted of 459 day-working employees (68.41% female, M_{age} =41.14, standard deviation =10.90) who completed measures of demographics, workaholism, and sleep disorders.

Results: Results showed that 40.31% were at risk for at least one sleep disorder, and 28.98% for multiple. Compared to employees with lower workaholism, those with higher workaholism had significantly higher scores of breathing-related sleep disorder, insomnia, narcolepsy, restless legs/periodic limb movement disorder, and circadian rhythm sleep disorder. Moderation analysis revealed that workaholism significantly moderated the relationship between insomnia severity and affective symptoms, but not vice versa. As workaholism increased, the relationship between insomnia severity and affective symptoms became stronger.

Conclusion: These findings suggest a high prevalence of sleep disorders among employees and that workaholism can exacerbate the affective burden of insomnia. Targeted interventions addressing both sleep

Öz

Amaç: Uyku bozuklukları duygusal zorluk ve işlevsellikteki bozulmalar ile güçlü ilişkileri nedeniyle iş sağlığı alanında giderek artan bir endişe kaynağına dönüşmüştür. Şiddetli uykusuzluk çeken çalışanlar, anksiyete ve depresyon gibi afektif belirtiler açısından yüksek risk altındadır. Ancak, bu etkilerin işle ilgili davranışsal örüntülere bağlı olarak değişebileceği söylenebilir. Bu bağlamda, aşırı çalışma dürtüsü ile karakterize olan işkoliklik, uykusuzluğun afektif belirtiler ve afektif belirtilerin uykusuzluk üzerindeki etkilerini potansiyel olarak yoğunlaştıran bir düzenleyici değişken olarak işlev görebilir. Bu çalışmanın amacı, çalışanlar arasında uyku bozukluğu riskini değerlendirmek, işkoliklik düzeylerine göre uyku bozuklukları şiddetindeki farklılıkları incelemek ve uykusuzluk şiddeti ve afektif belirtiler arasındaki ilişkilerde işkolikliğin düzenleyici rolünü araştırmaktır.

Gereç ve Yöntem: Çalışmanın örneklemi gün içinde çalışan ve demografik özellikler, işkoliklik ve uyku bozukluğu ölçeklerini dolduran 459 kişiden (%68,41 kadın, ortalama yaş =41,14, standart sapma =10,90) oluşmaktadır.

Bulgular: Sonuçlar, çalışanların %40,31'inin en az bir uyku bozukluğu, %28,98'inin ise birden fazla uyku bozukluğu açısından risk altında olduğunu göstermiştir. İşkolikliği düşük olanlara kıyasla yüksek olan bireylerde solunumla ilişkili uyku bozukluğu, uykusuzluk, narkolepsi, huzursuz bacak/periyodik uzuv hareketi bozukluğu ve sirkadiyen ritim uyku bozukluğu puanları anlamlı derecede yüksek bulunmuştur. Düzenleyici değişken analizi, işkolikliğin uykusuzluk şiddeti ile afektif belirtiler arasındaki ilişkiyi anlamlı olarak düzenlediğini ancak afektif belirtiler ile uykusuzluk şiddeti arasındaki ilişkiyi düzenlemediğini göstermiştir. İşkoliklik artıkça uykusuzluk şiddeti ile afektif belirtiler arasındaki ilişki güçlenmektedir.

Address for Correspondence/Yazışma Adresi: Kutlu Kağan Türkarslan, Asst. Prof, Ankara Medipol University, Faculty of Administrative and Social Sciences, Department of Psychology, Ankara, Türkiye
E-mail: kkturkarslan@hotmail.com **ORCID-ID:** orcid.org/0000-0002-2440-3977
Received/Geliş Tarihi: 21.04.2025 **Accepted/Kabul Tarihi:** 24.06.2025 **Publication Date/Yayınlanma Tarihi:** 09.09.2025

Cite this article as: Nalbantoğlu Y, Türkarslan KK. Workaholism and sleep disorders in employees: the moderator roles of workaholism in the relationships between insomnia and affective symptoms. J Turk Sleep Med. 2025;12(3):176-185

Copyright© 2025 The Author. Published by Galenos Publishing House on behalf of Turkish Sleep Medicine Society.
This is an open access article under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 (CC BY-NC-ND) International License.

health and workaholism may be critical for improving employee well-being.

Keywords: Sleep disorders, insomnia, affective symptoms, workaholism, moderation

Sonuç: Bu bulgular, çalışanlar arasında uyku bozukluğu yaygınlığının yüksek olabileceğine işaret etmekte ve işkolikliğin uykusuzluğun afektif yükünü daha da ağırlaştırabileceğini ortaya koymaktadır. Hem uyku sağlığını hem de işkolikliği hedef alan müdahalelerin, çalışanların refahını artırmak için kritik öneme sahip olduğu görülmektedir.

Anahtar Kelimeler: Uyku bozuklukları, uykusuzluk, afektif belirtiler, işkoliklik, düzenleyici

Introduction

Insufficient sleep results a to wide range of adverse outcomes affecting cognitive functioning, mood regulation, neurobehavioral performance, physiological health, and overall disease risk, thereby making it a significant public health concern.[1] Disruptions in sleep duration, timing, or quality may stem from various causes, among which sleep disorders represent one of the most substantial contributors.[2] Sleep disorders can manifest as difficulties initiating or maintaining sleep, excessive daytime sleepiness, or unusual movements while sleep.[3] Given their diverse and serious consequences, identifying and addressing sleep disorders is essential for promoting overall health and well-being across multiple domains, including the workplace.

Modern work environments, characterized by high demands and ever-increasing pressures, are growingly impacted by health-related challenges, such as sleep disorders, which extend well beyond traditional physical illnesses.[4,5] The findings of 2008 Sleep in America Poll (Sleep, Performance and the Workplace) reported that 37% of employees working 30 hours or more were at-risk for at least one disorder, while 9.6% of them were as at-risk for multiple sleep disorders.[6] Similarly, a nationwide study of Turkish adult workforce by Firat et al.[7] found the prevalence rates of parasomnia, poor sleep, obstructive sleep apnea, insomnia, excessive sleepiness, and restless leg syndrome as 19.2%, 17.0%, 9.1%, 6.1%, 5.2%, and 2.7%, respectively. In occupational settings, sleep disturbances have been consistently linked to impaired performance outcomes such as increased presenteeism, absenteeism, and occupational accidents with the associated economic burden estimated to range from US $322 (in 1995) to US $1,967 (in 2010) per employee.[8] Likewise, poor sleep quality was a risk factor for absenteeism, while poor sleep quality, excessive sleepiness, and parasomnia were risk factors for delay to work in the study by Firat et al.[7] Among sleep disorders, insomnia have emerged as critical public health problem[9,10] impacting workplace settings.[11]

The most recent research defines insomnia as a sleep disorder characterized by difficulties in initiating and sustaining sleep, as well as experiencing early morning awakenings.[12] An estimated 10% of adults meet the diagnostic criteria for insomnia disorder, while another 20% report experiencing intermittent symptoms of insomnia.[9] Although often situational or episodic, insomnia becomes chronic in over half of those affected, particularly those with heightened vulnerability following initial episodes triggered by stress, health issues, irregular schedules, or jet lag.[13] Insomnia may also increase the risk of various adverse health outcomes, such as physical illnesses (e.g., cardiovascular problems and metabolic disorders) and mental disorders (e.g., major depression and anxiety disorders).[14] Furthermore, in workplace settings, insomnia significantly impairs occupational functioning and productivity, increases absenteeism and the risk of accidents and long-term disability, and imposes substantial direct and indirect economic burdens on individuals and the healthcare system.[7,9,11,15,16] Given the wide-ranging impacts of insomnia on health and workplace functioning, it is important to consider psychosocial factors, such as workaholism, that may exacerbate or sustain insomnia and sleep problems.

The concept of workaholism, defined as an uncontrollable and excessive commitment to work, has garnered attention as a significant workplace problem.[17] Over the past two decades, research has increasingly conceptualized workaholism negatively, as an addiction characterized by a compulsive motivation to work and excessive cognitive and time investment.[18] A recent meta-analysis, including data from 23 countries, found a 14.1% prevalence rate for workaholism.[19] Although workaholism is often socially endorsed in high-achievement contexts, its underlying compulsive nature is associated with elevated levels of stress, burnout, and negative mood states.[20] Previous research has consistently linked workaholism to a range of negative outcomes, including impaired physical and mental health, reduced life satisfaction, strained interpersonal relationships, and adverse organizational consequences.[19] A number of studies have also revealed that higher levels of workaholism are associated with more sleep problems.[21-24] In one study examining different types of workers (workaholics, positive workers, compulsive workers, and hard workers), workaholics were shown to have significantly more sleep disturbances, including morning fatigue, falling asleep while driving, and reduced sleep duration during both weekdays and weekends, compared to other types of workers.[25] Using a longitudinal design covering 10 work days, Menghini and Balducci[26] found that employees experienced increased systolic and diastolic blood pressure, heightened emotional exhaustion, and greater sleep disturbances on workdays with higher symptoms of workaholism.

It can be argued that workaholism contributes to sleep problems through behavioral, cognitive, and physiological pathways. Working excessively increases job demands and reduces recovery time, resulting in physical and emotional exhaustion that disrupts sleep.[22,25] In addition, compulsive work-related thoughts cause heightened arousal and stress, making it difficult to fall asleep or stay asleep.[22] Finally, chronic stress from workaholism may also dysregulate the hypothalamic-pituitary-adrenal axis, a key stress-response system, resulting

in prolonged physiological arousal that interferes with sleep quality and increases sleep latency.[23,25]

Given that affective symptoms of depression and anxiety are reciprocally associated with insomnia[27,28] and that workaholism is significantly associated with a range of psychiatric disorders,[29] it is possible to argue that workaholism may moderate the relationship between insomnia severity and affective symptoms. It was hypothesized that when stress and burnout caused by workaholism interact with negative affect and emotion dysregulation resulting from insomnia, these factors may exacerbate affective consequences of insomnia. Similarly, when stress and burnout caused by workaholism interact with affective symptoms such as anxiety and depression, these factors may amplify the effects of affective symptoms on insomnia. These bidirectional interactions may result in a vicious cycle of worsening insomnia and affective symptoms in employees with high levels of workaholism.

In summary, the present study had three primary aims. The initial aim was to screen for sleep disorders risk among Turkish employees, as sleep disorders are prevalent and have a substantial impact on both work performance and the well-being of employees. The second aim was to investigate differences in the severity of sleep disorders among employees based on their workaholism scores. The third aim was to examine the moderator role of workaholism in the relationships between insomnia severity-affective symptoms and affective symptoms-insomnia severity. The moderation models were depicted in Figure 1.

The specific hypotheses regarding the differences in the severity of sleep disorders among employees based on their workaholism scores were:

1. Individuals with high workaholism would have statistically higher breathing-related sleep disorders scores than individuals with low workaholism.
2. Individuals with high workaholism would have statistically higher insomnia scores than individuals with low workaholism.
3. Individuals with high workaholism would have statistically higher narcolepsy scores than individuals with low workaholism.
4. Individuals with high workaholism would have statistically higher restless legs/periodic limb movement disorder scores than individuals with low workaholism.
5. Individuals with high workaholism would have statistically higher circadian rhythm sleep disorder scores than individuals with low workaholism.
6. Individuals with high workaholism would have statistically higher sleepwalking scores than individuals with low workaholism.
7. Individuals with high workaholism would have statistically higher nightmare disorder scores than individuals with low workaholism.
8. Individuals with high workaholism would have statistically higher impact of sleep complaints on daily functioning scores than individuals with low workaholism.

The specific hypotheses regarding the moderator role of workaholism in the relationship between insomnia severity and affective symptoms were:

9. Higher insomnia severity would predict higher affective symptoms.
10. Higher workaholism would predict higher affective symptoms.
11. Higher interaction of insomnia severity and workaholism would predict higher affective symptoms.

Finally, the specific hypotheses regarding the moderator role of workaholism in the relationship between affective symptoms and insomnia severity were:

12.Higher affective symptoms would predict higher insomnia severity.
13.Higher workaholism would predict higher insomnia severity.
14.Higher interaction of affective symptoms and workaholism would predict higher insomnia severity.

Materials and Methods

Participants

Data for the present study were collected from 459 employees who were working during the day and were over the age of 18. They were recruited using a convenience sampling method via the internet and social media. The mean age of the sample was 41.14 (standard deviation (SD) =10.90). Three hundred fourteen participants (68.41%) identified as female, while 145 participants (31.59%) identified as male. Regarding marital status, 100 participants (21.79%) were single and not in a relationship, 49 participants (10.6%) were single but in a relationship, and 310 participants (67.5%) were married. Only 40 participants (8.7%) were students. Finally, 315 participants (68.6%) reported having a moderate-income level. The demographic details and sleep-related behaviors of the sample can be seen in Table 1.

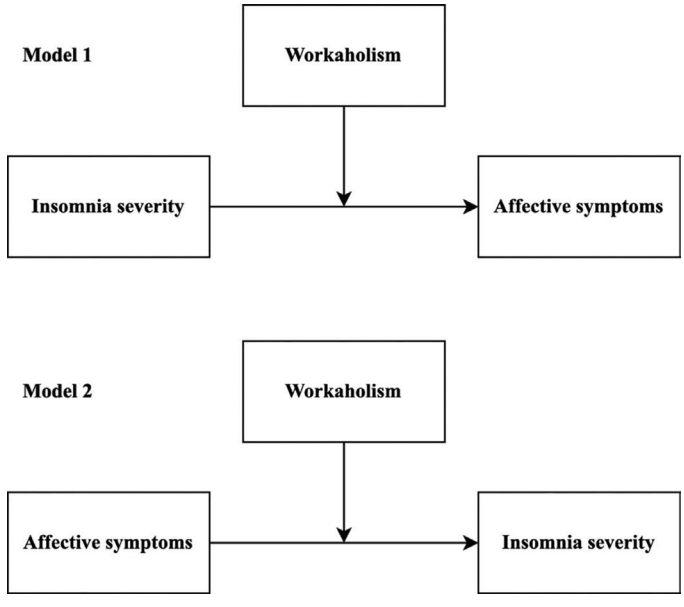


Figure 1. The hypothesized moderation models

Table 1. The demographic details of the sample		
	M	**SD**
Age	40.14	10.90
Work experience (years)	16.21	11.08
Black tea after 18:00 (cup)	1.77	1.73
Coffee after 18:00 (cup)	0.52	0.68
Gender	**n**	**%**
Female	314	68.41
Male	145	31.59
Student		
Yes	40	8.71
No	419	91.29
Education		
Primary school	1	0.21
Secondary school	3	0.65
High school	18	3.92
Associate's degree	16	3.48
Bachelor's degree	296	64.48
Master's degree	105	22.87
Doctorate degree	20	4.35
Marital status		
Single/no relationship	100	21.78
Single/in a relationship	49	10.67
Married	310	67.53
Perceived socio-economic status		
Very low	6	1.30
Low	69	15.03
Medium	315	68.62
High	67	14.59
Very high	2	0.43
Smoking		
No	286	62.31
Yes	173	37.69
Exercise frequency (day)		
0	206	44.88
1	57	12.42
2	75	16.34
3	80	17.43
4	13	2.83
5	18	3.92
6	2	0.44
7	8	1.74
Bedtime screen time (minutes)		
0	134	29.19
10	87	18.95
20	64	13.94
30	93	20.26
40	17	3.70
50	10	2.18
60	39	8.50
>60	15	3.28
SD: Standard deviation, M: Mean		

Demographic Information Form

A demographic information form was utilized to gather data pertaining to the characteristics of the participants, including their age, gender, student status, educational level, work experience, marital status, perceived socioeconomic status, smoking status, consumption of black tea and coffee after 18:00, exercise frequency, and bedtime screen time.

DUWAS Workaholism Scale

The DUWAS Workaholism Scale was developed by Schaufeli et al.[30] by combining items of the Work Addiction Risk test[31] and the Workaholism Battery[32]. The scale had a two-factor structure (working excessively and working compulsively) with 17 items. The items are rated on a 5-point likert type scale (1 =totally disagree, 5 =totally agree). Higher scores on the subscales indicate a higher level of working excessively or working compulsively. Sample items from the scale include "I seem to be in a hurry and racing against the clock" and "I feel obliged to work hard, even when it is not enjoyable". The scale was adapted into Turkish by Doğan and Tel.[33] The Turkish version also had a two-factor structure and the Cronbach's alpha coefficients were 0.85 for total scale, 0.76 for working excessively, and 0.74 for working compulsively. In the present study, the DUWAS Workaholism Scale was used to assess workaholism levels of the employees and the Cronbach's alpha coefficient was 0.91.

SLEEP-50 Questionnaire

The SLEEP-50 questionnaire was developed by Spoormaker et al.[34] to detect sleep disorders listed in the DSM-IV-TR. The questionnaire includes 52 items evaluating breathing-related sleep disorders, insomnia, narcolepsy, restless legs/periodic limb movement disorder, circadian rhythm sleep disorder, sleepwalking, nightmares, factors influencing sleep, the impact of sleep complaints on daily functioning, subjective sleep quality, and subjective sleep duration. The items are rated on a 4-point likert scale 1 =not at all, 4 =very much. Higher scores on the subscales indicate higher severity of the sleep problem. Sample items from the questionnaire include "I often snore loudly at night", "I have difficulty falling asleep at night", "I find myself falling asleep unexpectedly during the day", "I feel the need to move my legs while trying to sleep", "I go to bed at very different times", "I sometimes walk around while I'm asleep", "I frequently wake up from unsettling dreams", "I drink alcoholic beverages during the evening", and "I feel tired at getting up".

The cut-off values assessing sleep disorders were: a score of 15 and more from breathing-related sleep disorders subscale, a score of 19 and more from the insomnia subscale, a score of 7 and more from the narcolepsy subscale, a score of 7 and more from the restless leg/periodic limb movement disorder subscale, a score of 8 from the circadian rhythm sleep disorder subscale, a score of 7 and more from the sleepwalking subscale, and a score of 9 and more from the nightmare disorder subscale. In addition, a score of 15 and more from the impact of sleep complaints on daily functioning subscale is required to detect any sleep disorder. The questionnaire also provides scores

for affective disorder (measured by four items pertaining to depression and anxiety symptoms), sleep state misperception, and hypersomnia. The questionnaire was adapted to Turkish by Yildirim et al.[35] The Cronbach's alpha coefficients and test-retest correlations of the subscales were between 0.52 and 0.83, and 0.51 and 0.80, respectively. In the present study, the SLEEP-50 questionnaire was used to detect probable sleep disorders in the sample and assess affective symptoms (measured by the affective disorder subscale) and insomnia severity. Cronbach's alpha coefficients of the subscales were 0.73 for breathing-related sleep disorder, 0.85 for insomnia, 0.68 for narcolepsy, 0.80 for restless legs/periodic limb movement disorder, 0.65 for circadian rhythm sleep disorder, 0.80 for sleepwalking, 0.53 for nightmare, 0.85 for the impact of sleep complaints on daily functioning, and 0.79 for affective disorder.

Procedure

The ethical approval of the present study was granted by Atılım University Human Research Ethics Committee (date: 07.06.2024, approval number: 88177). The participants were recruited using convenience sampling. Data for the present study was collected online between June and September 2024 via the SurveyMonkey platform. All participants were provided with an overview of the study's objectives, information on the voluntary nature of their participation, their right to withdraw from the study, and specific details regarding how their information would be used for research purposes. They were also assured that their data would be kept completely confidential. Their consent was obtained through the informed consent form. The duration of the study was approximately 15 minutes.

Statistical Analysis

The analyses for the present study were conducted using the SPSS 25 (for data editing and moderation analyses) and JASP 19.3.0 (for correlation analysis, reliability coefficients and standardized moderation estimates). The relationship between study variables was examined with Pearson correlations. The severity of sleep disorders based on workaholism levels (categorized as low and high based on the mean) was assessed using Student and Welch's t-tests and while homogeneity of variances was examined by Levene's test. The assumptions were evaluated for linearity (scatter plots), univariate normality [skewness (-2.0, 2.0) and kurtosis (-7.0, 7.0) values], multivariate normality (Mardia's test), homoscedasticity (residuals vs. predicted plot), and multicollinearity [tolerance (>0.01) and variance inflation factor (<10) values]. PROCESS macro was used to examine the moderator role of workaholism in the relationship between insomnia severity-affective symptoms and affective symptoms-insomnia severity.[36] To assess the moderation effect, the required sample size to reach 0.80 statistical power was calculated as 395 with parameters of small effect size (f^2=0.02), a single tested predictor and a total of three predictors. The reliabilities of the scales used were examined with Cronbach's alpha coefficients.

Results

Sleep Descriptives Based on SLEEP-50 Questionnaire

Based on the subscale-specific cut-off values and a score of 15 and more on the impact of sleep complaints on daily functioning subscale, 13.07% of the sample had high risk for breathing-related sleep disorders, 20.48% for insomnia, 0.44% for sleep state misperception, 32.68% for narcolepsy, 21.35% for restless legs/periodic limb movement disorder, 2.61% for circadian rhythm sleep disorder, 0.65% for sleepwalking, 1.09% for nightmare disorder, and 4.58% for hypersomnia. The majority of the participants were free from poor sleep practices, such as too light/too noisy bedroom, alcohol or smoke at night, and the use of sleep/other medications. The details of sleep descriptives are shown in Table 2.

Differences Between Sleep Disorder Severities Based on Workaholism Levels

Four students and three Welch t-tests (in cases of inequality of variances) were conducted. Compared to the low workaholism group, the high workaholism group had significantly higher scores of breathing-related sleep disorder, $t(457)=2.85$, $p<0.001$, $d=0.27$; insomnia, $t(451.32)=4.46$, $p<0.001$, $d=0.42$, narcolepsy, $t(457)=2.47$, $p<0.001$, $d=0.23$; restless legs/periodic limb movement disorder, $t(444.78)=4.72$, $p<0.001$, $d=0.44$, and circadian rhythm sleep disorder, $t(457)=2.53$, $p<0.001$, $d=0.24$. Finally, the high workaholism group (m=15.35, SD=4.15) had significantly higher scores on the impact of sleep complaints on daily functioning than the low workaholism group (m=13.66, SD=3.73), $t(457)=4.58$, $p<0.001$, $d=0.43$. The details of the comparisons can be seen in Table 3.

Table 2. The risks for sleep disorders and poor sleep practices of the sample based on the SLEEP-50 Questionnaire (n=459)

	n	%
Sleep disorders		
Breathing-related sleep disorders	60	13.07
Insomnia	94	20.48
Sleep state misperception	2	0.44
Narcolepsy	150	32.68
Restless legs/periodic limb movement disorder	98	21.35
Circadian rhythm sleep disorder	12	2.61
Sleepwalking	3	0.65
Nightmares	5	1.09

Table 2. Continued				
	n			%
Hypersomnia	21			4.58
Any sleep disorder	185			40.31
More than one sleep disorders	113			28.98
	(Not at all =0)	(A little =1)	(Rather much =2)	(Very much =3)
Poor sleep practices				
Bedroom condition - too light	357 (77.79%)	87 (18.95%)	15 (3.27%)	0 (0.00%)
Bedroom condition - too noisy	392 (85.40%)	62 (13.51%)	5 (1.09%)	0 (0.00%)
Alcohol at night	274 (59.70%)	169 (36.82%)	14 (3.05%)	2 (0.44%)
Smoke at night	294 (64.05%)	83 (18.08%)	66 (14.38%)	16 (3.49%)
Sleep/other medication	421 (91.72%)	34 (7.41%)	0 (0.00%)	0 (0.00%)

Table 3. The differences in sleep disorders severity based on workaholism levels (n=459)						
Sleep disorder	**Test**	**High workaholism M (SD)**	**Low workaholism M (SD)**	**t**	**df**	**Cohen's d**
Breathing-related sleep disorders	Student	13.12 (3.28)	12.27 (3.04)	2.85**	457.00	0.27
Insomnia	Welch	17.80 (4.77)	15.94 (4.13)	4.46***	451.32	0.42
Narcolepsy	Student	7.62 (2.11)	7.11 (2.29)	2.47*	457.00	0.23
Restless legs/periodic limb movement disorder	Welch	6.60 (2.44)	5.62 (2.00)	4.72***	444.78	0.44
Circadian rhythm sleep disorder	Student	4.99 (1.44)	4.66 (1.41)	2.53*	457.00	0.24
Sleepwalking	Welch	3.16 (0.47)	3.26 (1.06)	-1.33	307.41	-0.13
Nightmare disorder†	Student	10.86 (1.92)	10.46 (1.63)	1.89	294.00	0.22
Impact	Student	15.35 (4.15)	13.66 (3.77)	4.58***	457.00	0.43
*p<0.05, **p <0.01, ***p<0.001. †n=296 SD: Standard deviation						

Correlations Between The Study Variables

The results showed that workaholism had small to moderate correlations with subjective sleep quality (r=-0.22, p<0.001), subjective sleep duration (r=-0.13, p<0.001), insomnia severity (r=0.29, p<0.001), and affective symptoms (r=0.35, p<0.001). Employees with higher levels of workaholism were more likely to have lower sleep quality, shorter sleep duration, and higher insomnia severity and affective symptoms. Moreover, there was a strong correlation (r=0.68, p<0.001) between insomnia severity and affective symptoms, indicating that employees with higher insomnia severity also tend to have higher affective symptoms. The correlations between the variables can be seen in Table 4.

Moderation Analysis

Two moderator analyses were conducted to assess the moderator roles of workaholism in the relationship between insomnia severity-affective symptoms and affective symptoms-insomnia severity. All assumptions of linear regression (i.e., linearity, normality, homoscedasticity, and multicollinearity) were met for both analyses. Despite being the subscales of the SLEEP-50, insomnia severity and affective symptoms were not highly correlated (r>0.80), which did not lead to a problem of discriminative validity or multicollinearity.[37] In the analysis regarding the insomnia severity-affective symptoms, ten multivariate outliers identified using Mahalanobis distance were excluded from further analyses, resulting in a final sample of 449 participants. The first model accounted for 47.30% of the variance in affective symptoms, F(3,445)=133.28, p<0.001. Insomnia severity [Beta (β)=0.59, B=0.31, standard error (SE) =0.02, t(445)=16.16, p<.001, 95% confidence interval (CI) (0.27, 0.34)] and workaholism [β=0.18, B=0.04, SE=0.01, t(454)=5.15, p<0.001, 95% CI (0.03, 0.06)], and the interaction of insomnia severity and workaholism [β=0.13, B=0.00, SE=0.00, t(445)=3.49, p<0.001, 95% CI (0.00, 0.01)] were significant predictors of affective symptoms. The moderation model 1 can be seen in Figure 2. The conditional effect of workaholism in the relationship between insomnia severity and affective symptoms was significant, ΔR^2=0.01, F(1, 445)=12.20, p<.01, suggesting that workaholism moderated the relationship. The interactions were probed using the pick-a-point method for workaholism (-1 SD, mean, and 1 SD); however, no statistical significance transition points were found within the observed range of the moderator variable found using the Johnson-Neyman method. Conditional effects of workaholism on the relationship between insomnia severity and affective symptoms can been seen in Table 5.

Table 4. The correlations between subjective sleep quality, sleep duration, insomnia severity, workaholism, and affective symptoms					
Variables	**1**	**2**	**3**	**4**	**5**
(1) Subjective sleep quality	-				
(2) Subjective sleep duration (hours)	0.42***	-			
(3) Insomnia severity	-0.61***	-0.34***	-		
(4) Workaholism	-0.22***	-0.13**	0.29***	-	
(5) Affective symptoms	-0.56***	-0.29***	0.68***	0.35***	-
M	6.48	6.99	16.89	45.79	7.93
SD	2.10	1.10	4.56	10.36	2.31
Minimum	0.00	3.00	8.00	14.00	4.00
Maximum	10.00	10.00	32.00	70.00	16.00
** p<0.01, *** p<0.001 SD: Standard deviation, M: Mean					

In the analysis regarding the affective symptoms-insomnia severity, three multivariate outliers identified using Mahalanobis distance were excluded from further analyses, resulting in a final sample of 456 participants. The second model accounted for 46.8% of the variance in insomnia severity, $F(3, 452) = 132.41$, $p<0.001$. Only affective symptoms [$\beta = 0.66$, $B = 1.32$, $SE = 0.08$, $t(452) = 16.78$, $p<0.001$, 95% CI (1.16, 1.47)] was a significant predictor of insomnia severity. The conditional effect of workaholism in the relationship between affective symptoms and insomnia was not significant, $\Delta R^2 = 00$, $F(1, 452) = 0.10$, $p = 0.75$, meaning that workaholism did not moderate the relationship. The moderation model 2 can be seen in Figure 3.

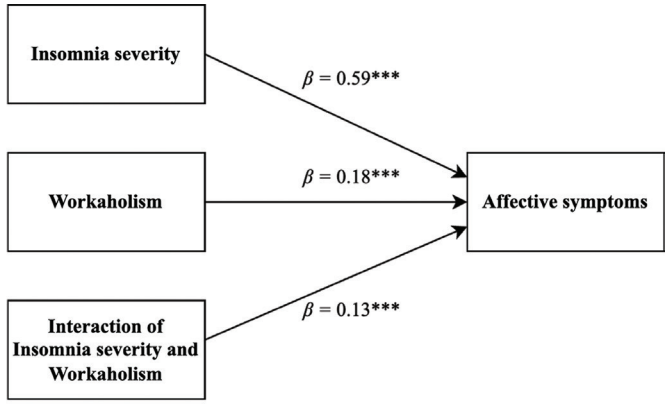


Figure 2. The moderator role of workaholism in the relationship between insomnia severity and affective symptoms

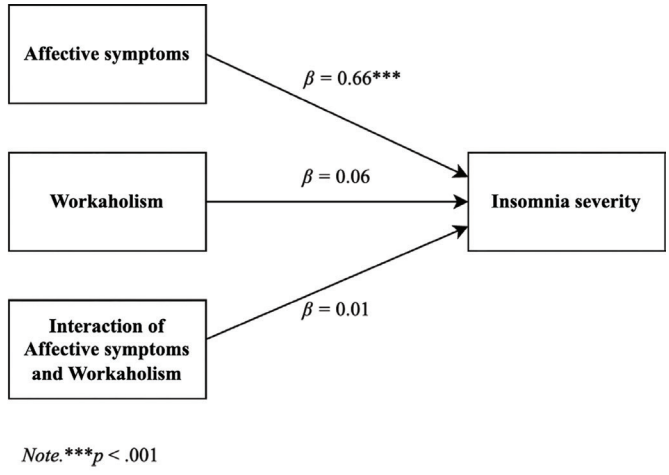


Figure 3. The moderation role of workaholism in the relationship between affective symptoms and insomnia severity

Discussion

The present study examined the risk of sleep disorders among employees, the differences in the severity of sleep disorders based on workaholism levels, and the moderator role of workaholism in the relationships between insomnia severity-affective symptoms and affective symptoms-insomnia severity. The results indicated that 40.31% of the employees were at risk for at least one sleep disorder, while 28.98% of them were at risk for more than one. Comparing the present findings with the results of the 2008 American Sleep Poll[6] and the study by Firat et al.[7], the risk rate for any single sleep disorder was found to be similar; however, the prevalence of employees at risk for more than one sleep disorder was notably higher in the present study. This discrepancy may stem from methodological differences, particularly due to the tools used to assess sleep disorder risk. The present study used the SLEEP-50, while the 2008 American Sleep Poll[6] and Firat et al.[7]'s studies utilized several scales such as the Epworth Sleepiness Scale or the STOP Questionnaire. Similarly, compared to the studies using the SLEEP-50 with college and medical students[35,38,39], we found different percentages for probable sleep disorder caseness in all sleep disorders covered. This difference could be due to the nature of the samples used by the studies. For example, the sample of Yildirim et al.[35] was affected by previous earthquakes

Table 5. The conditional relationship between insomnia severity and affective symptoms at values of workaholism							
Workaholism	**β**	**B**	**SE**	**t**	**p**	**LLCI**	**ULCI**
-1 SD	0.45	0.24	0.03	8.25	<0.001	0.18	0.30
Mean	0.59	0.31	0.02	16.16	<0.001	0.27	0.34
1 SD	0.71	0.37	0.02	15.51	<0.001	0.32	0.42
SD: Standard deviation, SE: Standard error, LLCI: Lower limit confidence interval, ULCI: Upper limit confidence interval							

in the Van region and increased post-traumatic stress disorder rates.[35]

Regarding the differences in sleep disorder scores based on workaholism levels, employees with higher workaholism levels had significantly higher scores for breathing-related sleep disorder, insomnia, narcolepsy, restless legs/periodic limb movement disorder, circadian rhythm sleep disorder and the impact of sleep problems on daily functioning but not for sleepwalking and nightmare disorder, supporting the hypotheses 1, 2, 3, 4, 5, and 8. The insignificant results for sleepwalking and nightmare disorder scores may be due to the low number of these cases in our sample. This broad spectrum of sleep pathology in the employees suggests that workaholism may interfere with general sleep quality and disrupt multiple physiological and behavioral components of the sleep system. Workaholics' long working hours and compulsive behavior may lead to less recovery time and increased stress, which in turn contribute to sleep problems.[25] Moreover, higher workaholism was associated with poor sleep quality, shorter sleep duration, higher insomnia severity, and increased affective symptoms. It is possible that workaholics' persistent thoughts about work, even when trying to rest, may lead to increased sympathetic arousal and cognitive activation, making it harder to fall asleep.[22,23,25] Overall, the findings supported previous studies indicating higher sleep disturbance severity in workaholics and associations between workaholism and sleep problems.[21-26]

The moderator analyses revealed that workaholism moderated the relationship between insomnia severity-affective symptoms, but not the relationship between affective symptoms-insomnia severity, partially supporting our hypotheses. In the first model, both insomnia severity and workaholism were significant predictors of affective symptoms which are in align with previous research[20,27,29,40] and supported the hypotheses 9 and 10. Insomnia may contribute to increased depressive and anxiety symptoms by disrupting emotional regulation, heightening negative emotionality, and impairing cognitive and physiological functioning, particularly through daytime distress and hyperarousal.[27,41] Similarly, workaholism may lead to higher depressive and anxiety symptoms by promoting chronic stress, emotional avoidance, and compulsive overworking that disrupts psychological well-being.[29] Moreover, the association between insomnia severity and affective symptoms was stronger in higher levels of workaholism, supporting the hypothesis 11. As insomnia severity increased, employees with higher levels of workaholism experienced a more pronounced increase in affective symptoms compared to those with lower levels of workaholism. In other words, workaholism may amplify the adverse affective consequences of insomnia. This finding could be explained by the fact that the added stress or the impaired psychological capital with excessive work behaviors[42,43] may exacerbate the negative affective impact of insomnia severity.

In the second model, affective symptoms significantly predicted insomnia severity, but workaholism and the interaction of affective symptoms and workaholism did not, supporting only the hypothesis 12. There could be several explanations for these findings. Regarding the main effect of workaholism, it is possible that workaholism may lead to stress or burn-out, but these effects may already be mediated by affective symptoms in the model, leaving affective symptoms as the stronger independent predictor. Therefore, future studies could examine a model in which affective symptoms mediate the relationship between workaholism and insomnia severity. Furthermore, regarding the moderator role of workaholism in the relationship between affective symptoms-insomnia severity, it may be possible that the relationship is relatively stable and resistant to modulation by behavioral and cognitive tendencies associated with workaholism, such as compulsive drive, intrusive work-related thoughts, excessive work investment, and difficulty detaching from work.

These insights have practical implications for workplace interventions aimed at promoting employee health. To improve sleep health, workplaces can introduce sleep education programs that raise awareness about the importance of sleep hygiene, screen for common sleep disorders, and provide guidance on healthy sleep practices.[44] Offering flexible work hours and limiting after-hours communication may also support employees in maintaining consistent sleep schedules. Workaholism, functioning as an internal stressor akin to external job demands, may contribute to emotional exhaustion, but psychological detachment can serve as a protective factor by facilitating recovery and mitigating the distress associated with prolonged work-related effort.[26] Organizations might consider implementing strategies to reduce workaholic behaviors, such as promoting work-life balance, encouraging regular breaks, and fostering a culture that values rest and recovery.[18,45] Additionally, providing resources for stress management and mental health support, such as meditation awareness training and counseling based on self-validation, can help mitigate the affective consequences associated with sleep disorders in workaholic individuals.[18,46]

Study Limitations

Several limitations of the present study should be acknowledged. Firstly, the sample had a gender imbalance, with fewer male participants than female participants. Additionally, the study only included employees working during the daytime. Future research should aim to recruit more balanced samples in terms of both gender and work schedules to improve representativeness. Secondly, the reliance on convenience sampling may have led to selection bias, which constrains the generalizability of the findings to broader populations. Thirdly, the cross-sectional design of the study provides only a snapshot of the data, making it difficult to draw conclusions about causal relationships or developmental trajectories. To address this, future studies would benefit from employing experimental and longitudinal designs to more rigorously examine the associations among workaholism, affective symptoms, and insomnia severity. Fourthly, we used the affective disorders subscale of the SLEEP-50, which included only four items to measure symptoms of anxiety and depression. In future studies, more comprehensive measures such as the Beck Depression Inventory or the Beck Anxiety Inventory may be utilized to assess affective symptoms. Finally, the SLEEP-50 Questionnaire, based on the DSM-IV-TR, was used to screen for sleep disorders in this study. The SLEEP-50 provided relatively high-risk rates for some sleep disorders, such as narcolepsy and restless legs/periodic limb movement disorder. The items in the narcolepsy subscale largely coincide with symptoms of hypersomnolence. These symptoms are not unique to narcolepsy and can also be present in conditions such as sleep deprivation, stress, depression, and work-related fatigue. There is a strong need for further assessment of the psychometric properties of the Turkish version of the SLEEP-50, particularly by addressing limitations of the study by Yildirim et al.[35] Future research could incorporate diagnostic clinical interviews to provide a more accurate identification of individuals with sleep disorders rather than using self-report measures.

Conclusion

In conclusion, the present study showed that employees may be at significant risk for sleep disorders and employees with higher levels of workaholism have higher scores for breathing-related sleep disorders, insomnia, narcolepsy, restless legs/periodic limb movement disorder, circadian rhythm sleep disorder and the impact of sleep problems on daily functioning. Furthermore, it was found that workaholism can exacerbate affective symptoms associated with insomnia. By addressing the relationship between workaholism, sleep health, and emotional well-being, employers can enhance overall employee productivity and reduce the long-term risk of burn-out.

Ethics

Ethics Committee Approval: The ethical approval of the present study was granted by Atılım University Human Research Ethics Committee (date: 07.06.2024, approval number: 88177).
Informed Consent: Informed consent was obtained from all individual participants included in the study.

Footnotes

Authorship Contributions

Concept: Y.N., K.K.T., Design: Y.N., K.K.T., Data Collection or Processing: Y.N., K.K.T., Analysis or Interpretation: Y.N., K.K.T., Literature Search: Y.N., K.K.T., Writing: Y.N., K.K.T.

Conflicts of Interest: No conflict of interest was declared by the authors.
Financial Support: The authors declared that this study received no financial support.

References

1. Chattu VK, Manzar MD, Kumary S, Burman D, Spence DW, Pandi-Perumal SR. The global problem of insufficient sleep and its serious public health implications. Healthcare. 2019;7(1):1.
2. Streatfeild J, Smith J, Mansfield D, Pezzullo L, Hillman D. The social and economic cost of sleep disorders. Sleep. 2021;44(11):132.
3. K Pavlova M, Latreille V. Sleep Disorders. Am J Med. 2019;132(3):292-299.
4. Xu T, Rugulies R, Vahtera J, et al. Workplace psychosocial resources and risk of sleep disturbances among employees. JAMA Netw Open. 2023;6(5):2312514.
5. Kurt Gök D, Peköz MT, Aslan K. Shift work and shift work sleep disorders: definition, symptoms and treatment. J Turk Sleep Med. 2017;4(1):30-34.
6. Swanson LM, Arnedt JT, Rosekind MR, Belenky G, Balkin TJ, Drake C. Sleep disorders and work performance: findings from the 2008 National Sleep Foundation Sleep in America poll. J Sleep Res. 2011;20(3):487-494.
7. Firat H, Yuceege M, Kiran S, et al. Absenteeism and delay to work due to sleep disorders in the Turkish adult population: a questionnaire-based national survey. Workplace Health Saf. 2019;67(1):27-35.
8. Glick DR, Abariga SA, Thomas I, et al. Economic impact of insufficient and disturbed sleep in the workplace. PharmacoEconomics. 2023;41(7):771-785.
9. Morin CM, Jarrin DC. Epidemiology of insomnia: prevalence, course, risk factors, and public health burden. Sleep Med Clin. 2022;17(2):173-191.
10. Şahan C, Tur MB, Demiral Y. The Relationship between psychosocial risks and sleep disorders in health care workers. J Turk Sleep Med. 2020;7(3):201-206.
11. Shahly V, Berglund PA, Coulouvrat C, et al. The associations of insomnia with costly workplace accidents and errors: results from the america insomnia survey. Arch Gen Psychiatry. 2012;69(10):1054-1063.
12. Riemann D, Espie CA, Altena E, et al. The European Insomnia Guideline: an update on the diagnosis and treatment of insomnia 2023. J Sleep Res. 2023;32(6):14035.
13. Morin CM, Buysse DJ. Management of Iinsomnia. N Engl J Med. 2024;391(3):247-258.
14. Wu TT, Zou YL, Xu KD, et al. Insomnia and multiple health outcomes: umbrella review of meta-analyses of prospective cohort studies. Public Health. 2023;215:66-74.
15. Espie CA, Pawlecki B, Waterfield D, Fitton K, Radocchia M, Luik AI. Insomnia symptoms and their association with workplace productivity: cross-sectional and pre-post intervention analyses from a large multinational manufacturing company. Sleep Health. 2018;4(3):307-312.
16. Gunes A, Sensoy B. Sleepiness, insomnia, and sleep quality of hospitalized patient with coronavirus disease-2019: sleep scale evaluation. J Turk Sleep Med. 2022;9(1):11-16.

17. Andreassen CS. Workaholism: an overview and current status of the research. J Behav Addict. 2014;3(1):1-11.
18. Taris TW, de Jonge J. Workaholism: taking stock and looking forward. Annu Rev Organ Psychol Organ Behav. 2024;11(1):113-138.
19. Andersen FB, Djugum MET, Sjåstad VS, Pallesen S. The prevalence of workaholism: a systematic review and meta-analysis. Front Psychol. 2023;14:1252373.
20. Clark MA, Michel JS, Zhdanova L, Pui SY, Baltes BB. All work and no play? A meta-analytic examination of the correlates and outcomes of workaholism. J Manag. 2016;42(7):1836-1873.
21. Ariapooran S. Sleep problems and depression in Iranian nurses: the predictive role of workaholism. Iran J Nurs Midwifery Res. 2019;24(1):30-37.
22. Kubota K, Shimazu A, Kawakami N, Takahashi M, Nakata A, Schaufeli WB. Association between workaholism and sleep problems among hospital nurses. Ind Health. 2010;48(6):864-871.
23. Kubota K, Shimazu A, Kawakami N, Takahashi M. Workaholism and sleep quality among japanese employees: a prospective cohort study. Int J Behav Med. 2014;21(1):66-76.
24. Schou Andreassen C, Ursin Holger, Eriksen HR. The relationship between strong motivation to work, "workaholism", and health. Psychol Health. 2007;22(5):615-629.
25. Salanova M, López-González AA, Llorens S, del Líbano M, Vicente-Herrero MT, Tomás-Salvá M. Your work may be killing you! Workaholism, sleep problems and cardiovascular risk. Work Stress. 2016;30(3):228-242.
26. Menghini L, Balducci C. The daily costs of workaholism: a within-individual investigation on blood pressure, emotional exhaustion, and sleep disturbances. J Occup Health Psychol. 2024;29(4):201-219.
27. Meneo D, Samea F, Tahmasian M, Baglioni C. The emotional component of insomnia disorder: a focus on emotion regulation and affect dynamics in relation to sleep quality and insomnia. J Sleep Res. 2023;32(6):13983.
28. Konjarski M, Murray G, Lee VV, Jackson ML. Reciprocal relationships between daily sleep and mood: a systematic review of naturalistic prospective studies. Sleep Med Rev. 2018;42:47-58.
29. Andreassen CS, Griffiths MD, Sinha R, Hetland J, Pallesen S. The relationships between workaholism and symptoms of psychiatric disorders: a large-scale cross-sectional study. PLoS One. 2016;11(5):e0152978.
30. Schaufeli WB, Taris TW, Bakker AB. Dr Jekyll or Mr Hyde? On the differences between work engagement and workaholism. In: research companion to working time and work addiction. New horizons in management. Edward Elgar Publishing; 2006:193-217.
31. Robinson BE. The work addiction risk test: development of a tentative measure of workaholism. Percept Mot Skills. 1999;88(1):199-210.
32. Spence JT, Robbins AS. Workaholism: definition, measurement, and preliminary results. J Pers Assess. 1992;58(1):160-178.
33. Doğan T, Tel FD. Duwas İşkoliklik Ölçeği Türkçe formunun (DUWASTR) geçerlik ve güvenirliğinin incelenmesi. Abant İzzet Baysal Univ Eğitim Fakültesi Derg. 2011;11(1).
34. Spoormaker VI, Verbeek I, van den Bout J, Klip EC. Initial validation of the SLEEP-50 questionnaire. Behav Sleep Med. 2005;3(4):227-246.
35. Yildirim A, Öğülmüş S, Yilmaz O, Boysan M. A psychometric investigation into the Turkish version of the SLEEP-50 questionnaire. J Cogn Behav Psychother Res. 2018;7(3):127-136.
36. Hayes AF. Introduction to mediation, moderation, and conditional process analysis: a regression-based approach. 3rd ed. New York: Guilford Press; 2022. Available from: https://www.guilford.com/books/Introduction-to-Mediation-Moderation-and-Conditional-Process-Analysis/Andrew-Hayes/9781462549030
37. Brown TA. Confirmatory factor analysis for applied research. 2nd ed. New York: Guilford Publications; 2015.
38. Gaultney JF. The prevalence of sleep disorders in college students: impact on academic performance. J Am Coll Health. 2010;59(2):91-97.
39. Yassin A, Al-Mistarehi AH, Beni Yonis O, Aleshawi AJ, Momany SM, Khassawneh BY. Prevalence of sleep disorders among medical students and their association with poor academic performance: a cross-sectional study. Ann Med Surg. 2020;58:124-129.
40. Hertenstein E, Benz F, Schneider CL, Baglioni C. Insomnia-A risk factor for mental disorders. J Sleep Res. 2023;32(6):13930.
41. Baglioni C, Spiegelhalder K, Lombardo C, Riemann D. Sleep and emotions: a focus on insomnia. Sleep Med Rev. 2010;14(4):227-238.
42. Makhdoom IF, Malik NI, Atta M, et al. When workaholism is negatively associated with burnout: a moderated mediation. Front Public Health. 2022;10:9688.
43. Andreassen CS, Pallesen S, Torsheim T. Workaholism as a mediator between work-related stressors and health outcomes. Int J Environ Res Public Health. 2018;15(1):73.
44. Robbins R, Jackson CL, Underwood P, Vieira D, Jean-Louis G, Buxton OM. Employee sleep and workplace health promotion: a systematic review. Am J Health Promot. 2019;33(7):1009-1019.
45. Cossin T, Thaon I, Lalanne L. Workaholism prevention in occupational medicine: a systematic review. Int J Environ Res Public Health. 2021;18(13):7109.
46. Gordon WV, Shonin E, Dunn TJ, Garcia-Campayo J, Demarzo MMP, Griffiths MD. Meditation awareness training for the treatment of workaholism: a controlled trial. J Behav Addict. 2017;6(2):212-220.