

Sleep Quality and Its Associations with ADHD Symptoms, Smartphone Use, and Social Support in University Students

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ABSTRACT

Objectives: This study aimed to investigate whether university students differ in terms of attention-deficit/hyperactivity disorder (ADHD) symptoms, smartphone overuse levels, and perceived social support based on their sleep quality. The goal was to examine how common sleep problems in young adulthood may influence behavioral and social functioning by analyzing these three critical variables.

Methods: A cross-sectional design was used, involving 311 university students aged 18–35 from a public university. Participants were grouped based on their self-reported sleep quality into “good” and “poor” sleep quality categories. Data were collected through an online survey including sociodemographic questions and three psychometric scales: the Smartphone Addiction Scale-Short Version (SAS-SV), the Adult Attention-Deficit/Hyperactivity Disorder Scale (AADHDS), and the Multidimensional Scale of Perceived Social Support (MSPSS). Statistical analyses were conducted using SPSS 27.0.

Results: Students with poor sleep quality scored significantly higher in ADHD symptoms and smartphone overuse while reporting lower levels of perceived social support. Significant differences were observed in the SAS-SV subscales of preoccupation, loss of control, and neglect of other areas, as well as in the AADHDS subscales of attention deficit and hyperactivity/impulsivity. All MSPSS subscales (family, friend, and significant other support) showed significantly lower scores among students with poor sleep quality.

Conclusion: The results indicate that university students experiencing poor sleep quality tend to report more pronounced symptoms of ADHD, engage in more problematic patterns of smartphone use, and perceive lower levels of social support. These outcomes underscore the importance of implementing comprehensive intervention strategies aimed at improving sleep quality by targeting key areas such as attentional control, responsible use of digital media, and the reinforcement of interpersonal support systems.

Keywords: sleep quality, ADHD symptoms, smartphone addiction, perceived social support, University students



INTRODUCTION

Sleep is a vital process that plays a fundamental role in maintaining an individual's physiological renewal, cognitive functionality, and emotional balance. Insufficient or poor-quality sleep can lead to numerous adverse outcomes, including attention deficits, mood disorders, weakened immune function, and impairments in daily functioning [1]. During young adulthood, sleep-related difficulties are commonly encountered and may impair multiple areas of functioning. Beyond diminished daily energy or reduced academic efficiency, poor sleep can also disrupt interpersonal relationships, lower psychological resilience, and hinder emotional and behavioral regulation [2]. It is suggested that deteriorations in sleep quality may be associated with outcomes such as decreased levels of perceived social support and increased use of digital devices [3,4]. Decreases in sleep quality can weaken an individual's social bonds, lead to deteriorations in friendships, and increase feelings of loneliness [2]. At the same time, a rise in social media and digital device use, especially during nighttime hours, further negatively affects sleep duration and quality, resulting in attention deficits, impulsivity, and fluctuations in academic performance [5]. In the literature, poor sleep quality has also been associated with symptoms of attention-deficit/hyperactivity disorder (ADHD), with both psychological and behavioral problems being more prevalent among these individuals [6]. Therefore, evaluating subjective sleep quality among young adults, such as university students, may offer important insights into identifying potential risk factors affecting psychological and social functioning.

Main Points

- Poor sleep quality among university students is significantly associated with higher levels of ADHD symptoms.
- Students with poor sleep quality show increased levels of problematic smartphone use, especially in terms of preoccupation and loss of control.
- Perceived social support is significantly lower in students with poor sleep quality, highlighting the role of interpersonal relationships in sleep health.
- The study emphasizes the need for holistic interventions that address attention regulation, digital media use, and social bonding to improve sleep quality in young adults.

This study aims to examine whether university students differ in terms of ADHD symptoms, levels of smartphone overuse, and levels of perceived social support based on their sleep quality. The study seeks to comparatively analyze the relationships among these three key variables in order to understand better the potential adverse effects that sleep problems, which are frequently observed during young adulthood, may have on behavioral and social functioning.

MATERIALS AND METHODS

This research is a cross-sectional study conducted to examine the differences in ADHD symptoms, levels of smartphone overuse, and perceived social support among university students based on their sleep quality. The sample of the study consists of a total of 311 students enrolled at a public university. Participants were selected using a convenience sampling method, and their ages ranged between 18 and 35 years. Data were collected through an online survey form.

In addition to the sociodemographic information form, three psychometric scales were used in the survey. The Smartphone Addiction Scale-Short Version (SAS-SV) was adapted into Turkish by Noyan et al. and consists of a total of 15 items and three subscales (preoccupation, loss of control, and neglect of other areas). The scale is assessed using a 5-point Likert-type rating system [7]. The Adult Attention-Deficit/Hyperactivity Disorder Scale (AADHDS), adapted into Turkish by Günay et al., includes two subscales: attention deficit and hyperactivity/impulsivity [8]. The Multidimensional Scale of Perceived Social Support (MSPSS) was adapted into Turkish by Eker and Arkar and consists of three subscales measuring perceived support from family, friends, and a significant other [9].

Sleep quality was assessed using a single self-report item: "How would you rate your overall sleep quality?". Responses were provided on a 4-point Likert scale: "very good," "good," "poor," and "very poor." Participants who responded with "very good" or "good" were categorized as having good sleep quality. In contrast, those who selected "poor" or "very poor" were categorized as having poor sleep quality. This classification approach allowed for a dichotomous grouping based on subjective perception. Ethical approval for this study was obtained from the institutional ethics committee.

Statistical Analysis

The analysis of the data involved computing descriptive

statistics such as the mean, standard deviation, median, and range (minimum and maximum values), alongside frequency and percentage distributions. To evaluate the distribution of the variables, the Kolmogorov-Smirnov and Shapiro-Wilk tests were employed. Group comparisons for independent quantitative data that deviated from normality were conducted using the Mann-Whitney U test. For categorical data, the Chi-square test was applied, and in cases where its assumptions were violated, Fisher's exact test was preferred. All statistical procedures were executed using SPSS software, version 27.0.

RESULTS

Of the 311 university students who participated in the study, 133 had good sleep quality, while 178 had poor sleep quality. When the two sleep quality groups were compared, no statistically significant differences emerged regarding participants' age, gender, year of study, living arrangements, or presence of chronic health conditions. However, a noteworthy distinction was found in their assessments of peer relationships: participants with better sleep quality were more likely to rate their friendships as "very good" compared to their counterparts with poor sleep quality ($p = 0.034$) (Table 1).

Table 1. Sociodemographic Characteristics by Sleep Quality Groups

Parameters		Sleep Quality							p	
		Good (n:133)				Poor (n:178)				
		Mean ± SD/n-%		Median	Mean ± SD/n-%		Median			
Age		22.2	±	5.9	21.0	21.3	±	4.8	20.0	0.087 ^m
Sex	Female	95		71.4%		119		66.9%		0.389 ^{X²}
	Male	38		28.6%		59		33.1%		
Which Grade Are You In?										
I		32		24.1%		45		25.3%		0.062 ^{X²}
II		54		40.6%		80		44.9%		
III		13		9.8%		25		14.0%		
IV		18		13.5%		11		6.2%		
V		1		0.8%		1		0.6%		
Doctor's Degree		0		0.0%		1		0.6%		
Graduate		3		2.3%		1		0.6%		
Master Degree		7		5.3%		3		1.7%		
Who Do You Live With?										
With My Family		70		52.6%		88		49.4%		0.864 ^{X²}
With My Friend		5		3.8%		7		3.9%		
By Myself		10		7.5%		20		11.2%		
In Dormitory		43		32.3%		57		32.0%		
Other		5		3.8%		6		3.4%		
Any Diagnosed Disease?	(-)	122		91.7%		153		86.0%		0.115 ^{X²}
	(+)	11		8.3%		25		14.0%		
How Do You Rate Your Relationships with Your Friends?										
Very Good		72		54.1%		53		29.8%		0.034 ^{X²}
Good		55		41.4%		105		59.0%		
Average		6		4.5%		18		10.1%		
Bad		0		0.0%		2		1.1%		

^m Mann-whitney u test / ^{x2} Chi-square test

The total score of the SAS-SV was significantly higher among participants with poor sleep quality (mean = 45.2, SD = 9.9) than those with good sleep quality (mean = 42.6, SD = 10.4) ($p = 0.007$). At the subscale level, significant differences were also observed in the scores for preoccupation ($p = 0.018$), loss of control ($p = 0.001$), and neglect of other areas ($p = 0.033$) (Table 2).

Table 2. Smartphone Addiction Scores According to Sleep Quality

SAS-SV	Sleep Quality								p
	Good (n:133)				Poor (n:178)				
	Mean ± SD			Median	Mean ± SD			Median	
Preoccupation Score	18.0	±	4.0	17.0	19.1	±	4.4	19.0	0.018 ^m
Loss of Control Score	7.1	±	2.2	7.0	7.7	±	1.9	7.0	0.001 ^m
Craving Score	6.1	±	2.1	6.0	6.3	±	1.8	6.0	0.273 ^m
Overuse Score	3.2	±	1.3	3.0	3.3	±	1.3	3.0	0.212 ^m
Neglect of Other Areas Score	2.5	±	0.9	2.0	2.8	±	1.1	2.0	0.033 ^m
Insight Score	5.7	±	2.2	5.0	6.0	±	2.2	5.5	0.192 ^m
Total Score	42.6	±	10.4	41.0	45.2	±	9.9	44.0	0.007 ^m

^m Mann-whitney u test

The total score of the Adult Attention Deficit and Hyperactivity Scale (AADHS) was significantly higher in individuals with poor sleep quality (Mean = 32.6 ± 10.1) compared to those with good sleep quality (Mean = 28.8 ± 11.2 ; $p = 0.001$). Significant differences were also observed between the groups in Section A ($p = 0.011$) and Section B scores ($p = 0.001$) (Table 3).

Table 3. Adult Attention-Deficit/Hyperactivity Disorder Scale Scores by Sleep Quality

<i>AADHS Score</i>	Sleep Quality								p
	Good (n:133)				Poor (n:178)				
	Mean ± SD			Median	Mean ± SD			Median	
Section A Score	9.9	±	4.1	10.0	11.1	±	4.0	11.0	<i>0.011</i> ^m
Section B Score	18.9	±	7.8	18.0	21.5	±	7.0	21.0	<i>0.001</i> ^m
Total Score	28.8	±	11.2	28.0	32.6	±	10.1	32.0	<i>0.001</i> ^m

^m Mann-whitney u test

Between-group comparisons also revealed statistically significant disparities in perceived social support scores, indicating that individuals with poor sleep quality tended to report lower levels of support than their counterparts with better sleep quality. The total score of the MSPSS was lower in individuals with poor sleep quality (Mean = 53.1 ± 15.4) compared to those with good sleep quality (Mean = 60.7 ± 15.3 ; $p = 0.001$). Significant differences were observed in the subscales of family support ($p = 0.001$), support from a significant other ($p = 0.001$), and friend support ($p = 0.001$) (Table 4).

Table 4. Perceived Social Support Scores by Sleep Quality

<i>MSPSS Score</i>	Sleep Quality								p
	Good (n:133)				Poor (n:178)				
	Mean ± SD			Median	Mean ± SD			Median	
Family Support Score	20.3	±	5.3	21.0	17.9	±	5.5	19.0	0.001 ^m
Support From Significant Other Score	20.5	±	5.6	21.0	18.0	±	5.5	18.0	0.001 ^m
Friend Support Score	19.8	±	5.8	20.0	17.1	±	6.2	17.0	0.001 ^m
Total Score	60.7	±	15.3	62.0	53.1	±	15.4	53.5	0.001 ^m

^m Mann-whitney u test

The internal consistency levels of the psychometric scales used were reported using Cronbach's alpha coefficients. The total score of the SAS-SV showed an alpha of $\alpha = 0.903$, the AADHDS showed an alpha of $\alpha = 0.879$, and the MSPSS showed an alpha of $\alpha = 0.890$ (Table 5).

Table 5. Cronbach's Alpha Values for Psychometric Scales Used in the Study

Psychometric Scales Scores	Cronbach Alpha
<i>SAS-SV Score</i>	
Preoccupation Score	0.817
Loss of Control Score	0.648
Craving Score	0.494
Overuse Score	0.739
Neglect of Other Areas Score	0.495
Insight Score	0.794
Total Score	0.903
<i>AADHS Score</i>	
Section A Score	0.739
Section B Score	0.832
Total Score	0.879
<i>MSPSS Score</i>	
Family Support Score	0.727
Support From Significant Other Score	0.711
Friend Support Score	0.736
Total Score	0.890

DISCUSSION

The present research investigated the association between university students' subjective sleep quality and their levels of ADHD symptomatology, smartphone dependency, and perceived social connectedness. The findings revealed that students with

poor sleep quality experienced more intense ADHD symptoms, exhibited more problematic behaviors related to smartphone use, and perceived lower levels of social support.

Students with poor sleep quality had significantly higher scores in smartphone overuse. This result reinforces the notion that the use of digital devices may adversely affect sleep patterns. In particular, the significant differences observed in the subscales of preoccupation, loss of control, and neglect of other areas indicate that these individuals are more dependent on or engage more uncontrollably with their phones. Preoccupation and loss of control are associated with the involuntary continuation of phone use. These patterns may increase cognitive arousal during the transition to sleep and thereby impair sleep quality. Neglect of other areas can be explained by the allocation of time that should be devoted to sleep hygiene instead of being spent on technology use. In the literature, many studies have reported that smartphone use, especially during nighttime hours, prolongs sleep onset latency, suppresses melatonin production, and decreases sleep quality. Punamäki et al. demonstrated that intensive use of information and communication technology negatively affects sleep habits in adolescents, increases levels of fatigue during waking hours, and consequently worsens perceived health status [10]. According to findings by Exelmans and Van den Bulck, engaging with mobile phones prior to sleep in adults correlates with delayed sleep onset, diminished sleep efficiency, more frequent nocturnal disturbances, and elevated levels of daytime fatigue [11]. In a study focusing on medical students, Popovic et al. identified that excessive smartphone use was notably linked not only to reduced sleep quality but also to elevated levels of psychological distress, including depression, anxiety, and stress [12]. Cain and Gradisar's comprehensive review of studies on electronic media and sleep concluded that

media engagement, especially before bedtime, tends to postpone sleep onset and reduce overall sleep duration, particularly in younger populations such as children and adolescents [13]. The findings presented in the literature are consistent with the relationship identified in this study between poor sleep quality and higher levels of smartphone use. This consistency strengthens the significance of the current finding and provides strong support for the study's results. Although the present study revealed a statistically significant relationship between poor sleep quality and higher levels of smartphone addiction, it is important to emphasize that the cross-sectional design does not allow for any causal inferences. Consequently, it cannot be determined whether poor sleep quality results in increased smartphone use or vice versa. Future research employing longitudinal or experimental designs is needed to clarify the directionality of this association.

In this study, it was found that university students with poor sleep quality had significantly higher total scores on the Adult Attention Deficit and Hyperactivity Scale (AADHDS). The significant differences observed, particularly in the subscales of attention deficit (Part A) and hyperactivity/impulsivity (Part B), suggest that sleep quality is associated with ADHD symptoms. Studies in the literature have also reported similar findings. Kwon et al. identified a notable link between ADHD symptomatology, and both diminished sleep quality and excessive smartphone use. Their findings also emphasized the predictive roles of academic challenges, sleep disturbances, and compromised daytime functionality in exacerbating ADHD-related behaviors [14]. In a study involving 290 university students, Kim et al. (2023) utilized the Pittsburgh Sleep Quality Index alongside the Adult ADHD Scale, revealing a statistically significant association between diminished sleep quality and heightened ADHD symptom levels [15]. Similarly, a study conducted with 3,691 adult ADHD patients reported that sleep disorders were highly prevalent and that individuals experiencing sleep problems exhibited more severe ADHD symptoms [16]. Vogel et al., in a study conducted with 942 adult participants, reported significant associations between the severity of ADHD symptoms and various sleep problems. Specifically, hyperactivity symptoms were found to be associated with insomnia, restless legs syndrome, and short sleep duration, whereas inattention symptoms were linked to an evening chronotype [17]. Schredl et al., in a study conducted with 120 adults diagnosed with ADHD, demonstrated that the inability to wake up feeling rested in the morning was closely associated with ADHD symptoms.

Additionally, they indicated that insomnia and other sleep disorders were linked to comorbid conditions and that treating these sleep disturbances could lead to improvements in ADHD symptoms [18]. The findings presented in the literature are consistent with the association identified in this study between poor sleep quality and ADHD symptoms. Similar results have been observed across various age groups and sample populations. This consistency enhances the reliability of the findings and supports the conclusions of the present study.

In this study, it was found that university students with poor sleep quality had significantly lower perceived levels of social support. The differences observed in the subdimensions related to family, friends, and significant others suggest that social support may be closely associated with sleep quality. A study among healthcare professionals highlighted that multiple psychosocial factors, including psychological resilience, perceived social support, and psychological distress influence sleep quality. Notably, the impact of perceived social support on sleep was found to be mediated by psychological distress rather than exerting a direct effect [19]. Likewise, Li's large-scale study involving university students demonstrated a significant link between perceived peer support and sleep quality. Structural equation modeling results based on a sample of 1,085 students revealed that greater levels of peer support were predictive of higher sleep quality [20]. Kent et al. found a notable association between the quality of social relationships and sleep quality. Their findings suggested that supportive interpersonal connections contributed to better sleep, with depression playing a significant mediating role in this relationship [21]. In a study conducted with adult public employees, it was also reported that individuals with strong social relationships had higher sleep quality. These findings suggest that there may be a bidirectional interaction between social relationships and sleep quality and that social bonds could play a determining role in functional outcomes related to sleep [22]. All these findings support the positive relationship between good sleep quality and perceived social support levels demonstrated in our study.

These findings emphasize the necessity of incorporating sleep quality education into university health programs. Interventions could include awareness campaigns on healthy technology use before bedtime, peer support groups aimed at enhancing social connectedness, and screenings for ADHD symptoms in students experiencing chronic sleep difficulties. Psychoeducational or behavioral therapy modules that simultaneously address digital

behaviors, emotional regulation, and sleep hygiene may offer multidimensional benefits.

In light of these recommendations, integrating such multifaceted interventions into existing academic and psychosocial support systems is of critical importance. A study conducted by Kwon et al. demonstrated that increased ADHD symptoms, associated with poor sleep quality and smartphone addiction, negatively affect student functionality [14]. This highlights the need to embed digital media counseling modules within university-based support services. Additionally, Li et al. explained the link between smartphone addiction and sleep disturbances through emotional dysregulation, suggesting that interventions should target not only behavioral but also emotional dimensions [23]. Supporting this view, findings from Türkiye by Zeyrek et al. indicated that campus-based awareness and screening programs could be effective in managing psychological variables related to sleep quality [24]. Collectively, these studies suggest that the proposed multidimensional approaches should encompass not only individual behavior modification but also structural and institutional strategies.

Limitations

This study has several limitations. Firstly, due to its cross-sectional design, it is not possible to draw direct conclusions about causal relationships between the variables. The direction and causality of the relationships between sleep quality, ADHD symptoms, smartphone use, and perceived social support can be better elucidated through future longitudinal studies. Secondly, as the data were collected through self-report measures, factors such as social desirability bias or recall bias may have influenced participants' responses. Thirdly, the sample was determined through convenience sampling and was limited to students from a single public university; therefore, the generalizability of the findings is restricted. Lastly, only psychometric scales were used in the study, and the lack of objective measurements (e.g., actigraphy, polysomnography) for evaluating a complex construct such as sleep quality constitutes a methodological limitation. Future research incorporating different sample groups and employing multi-method data collection techniques could enhance the validity and reliability of the findings.

CONCLUSION

This research demonstrated significant associations between sleep quality and ADHD symptoms, smartphone overuse, and

perceived social support among university students. Students reporting poor sleep quality exhibited elevated levels of ADHD-related behaviors, greater engagement in problematic smartphone use, and lower perceived support from social networks. Particularly, differences identified in the subdomains of smartphone use, such as preoccupation, impaired self-regulation, and disregard for other responsibilities, emphasize the role of digital media as a potential disruptor of sleep hygiene. Moreover, disparities observed in social support dimensions underline the possible contribution of robust interpersonal relationships to healthier sleep patterns.

Findings from the present study highlight the potential value of enhancing interpersonal connections and raising awareness about digital media use in fostering better sleep practices among young adults. From this perspective, it is recommended that intervention strategies designed to improve sleep quality adopt a multifaceted approach, encompassing attention regulation, mindful engagement with technology, and reinforcement of social support systems.

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