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Factors Affecting Sleep Quality in High School Students and its Relationship with Nomophobia

Lise Öğrencilerinde Uyku Kalitesi, Etkileyen Faktörler ve Nomofobi ile İlişkisi

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Abstract

Objective: A good sleep quality is essential for biopsychosocial health. Studies show that most high school students have poor sleep quality, and recently, nomophobia has also become common in high school students. This study aims to determine the factors affecting sleep quality and its relationship with nomophobia among high school students.
Materials and Methods: This cross-sectional study was conducted in 428 high school students. Pittsburgh sleep quality index and nomophobia scale were used for data collection. Factors affecting sleep quality were evaluated with both univariate and multivariate logistic regression analyses.
Results: The sleep quality in 65.7% of students was poor. Poor sleep quality was found to be increased by 1.70 (1.04-2.81) times in females; 6.82 (2.65-17.55) times in those having flu or other upper respiratory tract infections; 3.17 (1.50-6.68) times in those with gastrointestinal disorders; 4.40 (1.48-13.10) times in those overweight; and 2.99 (1.36-6.57) times in those with severe nomophobia ($p<0.05$).
Conclusion: Poor sleep quality in high school students is dramatic. Providing counselling on sleep hygiene, especially for risk groups and their families, will improve sleep quality among high school students.
Keywords: Adolescent, student, sleep quality, nomophobia, Turkey

Öz

Amaç: Biyopsikososyal sağlık için iyi bir uyku kalitesi şarttır. Araştırmalar, lise öğrencilerinin çoğunun düşük uyku kalitesine sahip olduğunu göstermektedir. Son zamanlarda lise öğrencilerinde nomofobi varlığı da yaygındır. Bu çalışmanın amacı, lise öğrencilerinde uyku kalitesi düzeyini ve etkileyen faktörleri belirlemek ve uyku kalitesi ile nomofobi arasındaki ilişkiyi belirlemektir.
Gereç ve Yöntem: Kesitsel tipteki bu çalışma 428 lise öğrencisi ile yapılmıştır. Veri toplama için Pittsburgh uyku kalitesi indeksi ve nomofobi ölçeği uygulanmıştır. Uyku kalitesini etkileyen faktörler hem tek değişkenli analizlerle hem de çok değişkenli lojistik regresyon analizi ile değerlendirilmiştir.
Bulgular: Öğrencilerin %65,7'sinin uyku kalitesi kötüdür. Kötü uyku kalitesi kadınlarda 1,70 (1,04-2,81) kat; grip veya diğer üst solunum yolu enfeksiyonu geçirenlerde 6,82 (2,65-17,55) kat; gastrointestinal rahatsızlığı olanlarda 3,17 (1,50-6,68) kat; fazla kilolu olanlarda 4,40 (1,48-13,10) kat; ağır nomofobi varlığında 2,99 (1,36-6,57) kat daha fazladır ($p<0,05$).
Sonuç: Lise öğrencilerinde kötü uyku kalitesi dramatik biçimde sıktır. Özellikle risk grupları ve aileleri için uyku hijyeni konusunda danışmanlık verilmesi lise öğrencilerinde uyku kalitesini artıracaktır.
Anahtar Kelimeler: Adölesan, öğrenci, uyku kalitesi, nomofobi, Türkiye

Introduction

Sleep is an absolutely necessary biological process for a healthy life. Sleep plays a critical role in brain function and body physiology including metabolism, appetite regulation and the functioning of the immune, hormonal and cardiovascular systems. Psychosocial health, school performance and risk-taking behaviors in adolescents are affected by sleep disturbances. The psychosocial health of adolescents with sleep disorders is negatively affected. Behavioral disorders, smoking, alcohol and substance usage, depression and anxiety problems are more common in the adolalescents with sleep disturbances. Even, interviews with families of adolescents who have attempted suicide have shown that these adolescents frequently experience sleep disorders. In addition, sleep disorders in adolescents result in high body mass index, high cholesterol level and high blood pressure (1). It is known that good quality sleep is inevitable for physical and mental health but studies in Turkey have shown that more than half of adolescents have poor sleep

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quality. According to these studies, poor sleep quality is caused by factors such as age, sex, chronic illness, lack of physical activity and domestic violence (2-4). Additionally, the digital world also changes the sleep quality of adolescents. According to a study, internet addiction increases the risk of poor sleep quality more than twice (2). According to another study, there is a moderate positive correlation between smartphone addiction and daytime sleepiness (5). Nomophobia was first used by King et al. (6) as an abbreviation for ''no mobile phone phobia'' in 2010. It has been defined as discomfort and anxiety experienced when staying away from the mobile phone (6). Although it is not included in the Diagnostic and Statistical Manual of Mental Disorders (DSM), nomophobia has been defined and studied with different names by many researchers. In Turkey, nomophobia has been studied many times. These studies found moderate-severe nomophobia in more than half of the adolescents (7,8). More than 90% of the adolescents in Turkey have their own mobile phones (9). And mobile phones are important parts of daily life of high school students. Therefore, it is important to determine the effect of mobile phones on the sleep quality of high school students.

The aim of this study is to determine the level of sleep quality and the affecting factors and to determine the relationship between sleep quality and nomophobia among high school students.

Materials and Methods

This cross-sectional study was conducted in a city center in Middle Anatolia named Niğde.

Participants and Procedure

Participants from 3 high schools in this province determined by cluster sampling method were included in the study. The sample size of the study was calculated using G*POWER software. When the power of the research is 95%, the alpha value is 5% and the effect size is 0.3; the minimum sample size was determined as 220. All classes were included in the research by stratification according to their size. During the data collection period of the study, face-to-face education was suspended due to the Coronavirus disease-2019 (COVID-19) pandemic. For this reason, the data was collected via online questionnaires (Google forms) from the students through the school administration. If the student and their parents consent, the student filled out the questionnaire.

Niğde Ömer Halisdemir University Ethics Committee permission (protocol number: 2020/12-13 and date: 29/12/2020), institutional permission and informed consent of the participants and their parents were obtained.

Measures

In this study, socio-demografic form created after literature review by the researchers, Pittsburgh sleep quality index (PSQI) and Nomophobia scale were used.

PSQI: This scale was developed by Buysse et al. (10) adapted to Turkish by Agargun et al. (11). Cronbach alpha value was found to be 0.80. PSQI is a 19-item self-report scale that evaluates sleep quality and disorder over the past month. It consists of 24 questions, 19 questions are self-report questions, 5 questions are questions to be answered by the spouse or roommate. The questions of the scale consist of 7 dimensions (subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, use of sleeping drugs and daytime dysfunction). Each dimension is evaluated on a score of 0-3. The total score of the 7 components gives the total score of the scale. The total score ranges from 0-21. A total score greater than 5 indicates ''poor sleep quality''.

Nomophobia scale: The scale was developed by Yildirim and Correia (12) The Turkish validity and reliability study of the scale in the 9-18 age group was conducted by Ozdemir and Bektas (9) and the Cronbach alpha value was found to be 0.90. The Nomophobia scale consists of four dimensions and 20 items. The scale has four sub-dimensions: ''inability to access information'' (4 items), ''loss of connection'' (5 items), ''inability to communicate'' (6 items), and ''not feeling comfortable'' (5 items). Seven-point Likert scoring was used for rating (1: strongly disagree to 7: strongly agree). Scoring is done as follows:

Scale score =20: No nomophobia
21≤ scale score <60: Mild nomophobia
60≤ scale score <100: Moderate nomophobia
100≤ scale score ≤140: Severe nomophobia.

Statistical Analysis

The data accessed through the online survey (Google forms) was analyzed using the SPSS 24 package program. Descriptive data was presented with median, minimum value, maximum value, frequency and percentage values. Chi-square test and Fisher's Exact test were used in the analysis of categorical data; Student t-test and Mann-Withney U were used in the analysis of continuous data. Also, logistic regression analysis with ''enter'' method was used for multivariant analysis of factors affecting sleep quality. The statistical significance level was accepted as 0.05.

Results

This study was completed with the participation of 428 students; 130 students (30.4%) from sports high school, 139 students (32.5%) from science high school and 159 students (37.1%) from health vocational high school in Niğde. Two hundred-ninety one (68.0%) of the students were females and median age number was 16 (13-18). Socio-demographic characteristics are shown in detail in Table 1.

Three hundred-eighty one (89.0%) of the participants have their own phone. Eleven students (2.6%) have chronic diseases and 10 students (2.3%) use a drug regularly. Asthma (2), heart disease (2), epilepsy (1), kidney disease (1), migraine (1), hypertension (1) and eye disease (1) have been specified as chronic disease. In addition, 5 students (1.2%) stated that they have a previously diagnosed psychiatric disorder. Major depression (2), intermittent explosive disorder (2) and anxiety disorder (1) were the diagnosed psychiatric disorders. The

number of participants who had flu or other upper respiratory tract infections in the last month was 72 (16.8%). This number was 14 (3.3%) for COVID-19 and 81 (18.9) for gastrointestinal disease. Approximately one out of every two female students stated that their menstrual periods were painful and difficult. The frequency of smoking was 2.8% and the frequency of alcohol usage was 1.9%. It was observed that 44.2% of the students did not exercise regularly. One out of every 10 students included in the study was overweight or obese. Domestic physical violence frequency among the students was 3.3%, while the domestic verbal violence frequency found te be 15.7%. According to the total score of the nomophobia scale, 46.3% of the students were found to be moderately nomophobic and 16.1% were severely nomophobic (Table 2).

The median value of the PSQI score, which indicates the sleep quality of the participants, was found to be 6. When the cut-off point is accepted as 5, it was found that 65.7% of the students had poor sleep quality (Table 3).

According to the univariate analyzes, female students compared to male students (p=0.030); low percieved income compared to others (p=0.046); those who had flu or other upper respiratory tract infections in the last month compared to those who did not (p<0.001); those who had COVID-19 in the last month compared to those who did not (p=0.041); those who had gastrointestinal disorder in the last month compared to those who did not (p<0.001); smokers compared to non-smokers (p=0.010); among female students, those who had a painful and difficult menstrual period compared to those who did

Table 1. Socio-demographic characteristics of the participants

n=428		**n (%)***
Age		16 (13-19)
Gender	Female	291 (68.0)
	Male	137 (32.0)
Class	9	148 (34.6)
	10	145 (33.9)
	11	75 (17.5)
	12	60 (14.0)
School type	Sports high school	130 (30.4)
	Science high school	139 (32.5)
	Health high school	159 (37.1)
Mother's alive	Yes	424 (99.1)
	No	4 (0.9)
Mother's education level	Illiterate	22 (5.1)
	Literate	6 (1.4)
	Primary school	175 (40.9)
	Secondary school	74 (17.3)
	High school	75 (17.5)
	University and above	76 (17.8)
Father's alive	Yes	413 (96.5)
	No	15 (3.5)
Father's educational level	Illiterate	5 (1.2)
	Literate	3 (0.7)
	Primary school	109 (25.5)
	Secondary school	97 (22.7)
	High school	99 (23.1)
	University and above	115 (26.9)
Perceived income level	Income is lower than expenses	115 (26.9)
	Income is equal to expenses	229 (53.5)
	Income is more than expenses	84 (19.6)
Sibling number		3 (1-8)

*Continuous variables are shown as median (minimum-maximum)

Table 2. The characteristics of participants that may be associated with sleep quality

n=428	**n (%)**
Having his/her own mobile phone	381 (89.0)
Having a chronic disease	11 (2.6)
Using a drug regularly	10 (2.3)
Having a diagnosed psychiatric disorder	5 (1.2)
Having had flu or similar upper respiratory tract infections in the last month	72 (16.8)
Having had COVID-19 in the last month	14 (3.3)
Having a gastrointestinal disorder in the last month	81 (18.9)
Using medicine for sleeping	3 (0.7)
Painful and difficult menstrual periods (n=288)	151 (52.4)
Having own room	275 (64.3)
Percieved school success as medium/bad	253 (59.1)/11 (2.6)
Smoking	12 (2.8)
Alcohol use	8 (1.9)
Physical exercise	239 (55.8)
Number of days exercised in a week (n=239)	3 (0.5-7)*
Being overweight/obese	33 (7.7)/9 (2.1)
Tea/coffee consumption	396 (92.5)
Number of coffee/tea cups consumed daily (n=396)	2.5 (0.5-20.0)*
Domestic verbal violence	67 (15.7)
Domestic physical violence	14 (3.3)
Moderate nomophobia/severe nomophobia	198 (46.3)/69 (16.1)

*Continuous variables are shown as median (minimum-maximum), COVID-19: Coronavirus disease-2019

Table 3. PSQI score and sleep quality classification of the participants

		Median (minimum-maximum)
PSQI score		6 (0-14)
		n (%)
Sleep quality	Good	147 (34.3)
	Poor	281 (65.7)

PSQI: Pittsburgh sleep quality index

not (p=0.006); overweight and normal weighted individuals compared to underweight (p=0.025); those who exposed to domestic verbal violence compared to who did not (p=0.002) and those who were severely and moderate nomophobic (p<0.001) compared to those who were not nomophobic or mildly nomophobic were found to have more frequent poor sleep quality (Table 4).

Age, parents living and education level, number of siblings, school type and class, presence of chronic disease, regular drug use, having diagnosed psychiatric disorder, perceived school success, having own room, tea and coffee consumption, alcohol use, physical exercise, domestic physical violence were found to have no statistically significant relationship with sleep quality according to univariate analyses (p>0.05).

According to the results of multivariate logistic regression analyzes; having poor sleep quality was found to be increased 1.70 (1.04-2.81) times among female sex compared to male sex; 6.82 (2.65-17.55) times among those who have had flu or other upper respiratory tract infections in the last month compared to did not; 3.17 (1.50-6.68) times among those who had gastrointestinal disorder in the last month compared to did not; 4.40 (1.48-13.10) times among the overweight students compared to underweight; 1.84 (1.14-2.96) times among the normal weighted students compared to underweight; 2.99 (1.36-6.57) times among severely nomofobics compared to non-nomofobics or mildly nomophobic (p<0.05) (Table 5).

Table 4. Evaluation of factors affecting participants' sleep quality using binary analysis methods

n=428		**Good sleep quality (n/%)**	**Poor sleep quality (n/%)**	**p***
Sex	Female	90 (30.9)	201 (69.1)	**0.030**
	Male	57 (41.6)	80 (58.4)	
Perceived income level	Income is lower than expenses	30 (26.1)	85 (73.9)	**0.046**
	Income is equal to expenses	90 (39.3)	139 (60.7)	
	Income is higher than expenses	27 (32.1)	57 (67.9)	
Using a drug regularly	Yes	1 (10.0)	9 (90.0)	0.175**
	No	146 (34.9)	272 (65.1)	
Having a diagnosed psychiatric disorder	Yes	0 (0.0)	5 (100.0)	0.170**
	No	147 (34.8)	276 (65.2)	
Having flu or upper respiratory tract infection in the last month	Yes	6 (8.3)	66 (91.7)	**<0.001**
	No	141 (39.6)	215 (60.4)	
Having COVID-19 in the last month	Yes	1 (7.1)	13 (92.9)	**0.041****
	No	146 (35.3)	268 (64.7)	
Having a gastrointestinal disorder in the last month	Yes	11 (13.6)	70 (86.4)	**<0.001**
	No	136 (39.2)	211 (60.8)	
Painful and difficult menstrual periods (n=288)	Yes	36 (23.8)	115 (76.2)	**0.006**
	No	53 (38.7)	84 (61.3)	
Percieved school success	Poor	1 (9.1)	10 (90.9)	0.127
	Moderate	84 (33.2)	169 (66.8)	
	Good	62 (37.8)	102 (62.2)	
Smoking	Yes	0 (0.0)	12 (100.0)	**0.010****
	No	147 (35.3)	269 (64.7)	
BMI classification	Underweight	73 (40.3)	108 (59.7)	**0.025**
	Normal	64 (31.7)	138 (68.3)	
	Overweight	5 (15.2)	28 (84.8)	
	Obese	4 (44.4)	5 (55.6)	
Tea/coffee consumption	Yes	132 (33.3)	264 (66.7)	0.121
	No	15 (46.9)	17 (53.1)	
Domestic verbal violance	Yes	12 (17.9)	55 (82.1)	**0.002**
	No	135 (37.4)	226 (62.6)	
Nomofobia	No/mild	70 (43.5)	91 (56.5)	**<0.001**
	Moderate	66 (33.3)	132 (66.7)	
	Severe	11 (15.9)	58 (84.1)	

*chi-square test, **Fisher's Exact test, BMI: Body mass index, COVID-19: Coronavirus disease-2019

Table 5. Evaluaiton of factors associated with sleep quality by logistic regression analysis				
		OR	**95% CI**	**p***
Female sex		1.70	1.04-2.81	**0.036**
Having flu or upper respiratory tract infection in the last month		6.82	2.65-17.55	**<0.001**
Having a gastrointestinal disorder in the last month		3.17	1.50-6.68	**0.002**
BMI classification	Underweight	1	-	-
	Normal	1.84	1.14-2.96	**0.012**
	Overweight	4.40	1.48-13.10	**0.008**
	Obese	0.34	0.05-2.19	0.262
Nomofobia	No/mild	1	-	-
	Moderate	1.22	0.74-2.00	0.417
	Severe	2.99	1.36-6.57	**0.006**

*Binary logistic regression-enter method (age, sex, perceived family income, using a drug regularly, diagnosed psychiatric disorder, flu or upper respiratory tract infection in the last month, COVID-19 in the last month, gastrointestinal disorder in the last month, perceived school success, smoking, tea/coffee consumption, BMI classification, domestic verbal violence, nomophobia variables were included in the model), BMI: Body mass index, COVID-19: Coronavirus disease-2019, CI: Confidence interval, OR: Odds ratio

Discussion

As a result of this research, it was observed that a significant part of high school students (65.7%) had poor sleep quality. In previous studies conducted with high school students, it was found that more than half of the participants (54.7% and 58.6%) had poor sleep quality (2,3). The fact that poor sleep quality is so frequent shows that the importance of this issue is gradually increasing. Due to this study was conducted during the pandemic period, poor sleep quality may have increased. The negative mood caused by the pandemic and disturbed sleep hygiene as a result of changing daily routines may lead to an increase in sleep problems among students during COVID-19 pandemic.

According to the results of this study, female students have increased risk compared to male students in terms of having poor sleep quality. A previous study showed that poor sleep quality risk increased 2.31 times among female high school students (4). Different biological characteristics and gender roles may put women at risk in terms of sleep quality as well as some other mental health problems.

This research found a strong relationship between having flu or other upper respiratory tract infections and poor sleep quality. It is clear that having a respiratory infection can acutely impair sleep quality. Previous studies have shown the association of poor sleep quality and infectious diseases (13). However, the relationship between sleep and infections is more complex and bi-directional. Poor sleep quality weakens the immune system and makes people more susceptible to many infections (14). Especially detoriation of immune system due to disturbed sleep quality among the students having frequent upper respiratory tract infections may turn the process into a vicious circle.

This research reveals that gastrointestinal problems are associated with poor sleep quality. A previous study showed that high school students with gastrointestinal problems are 2.68 times more at risk in terms of poor sleep quality (4). When these problems, which are not given enough importance in daily life, are not solved and become chronic, they negatively affect the quality of life and sleep.

This research revealed that especially overweight students are at risk in terms of poor sleep quality. Previous studies have revealed similar results (15). Being overweight and obese brings along poor sleep quality such as many other health problems.

Another dramatic finding of this study is that 62.4% of the participants had moderate or severe nomophobia. In previous studies, it was determined that nomophobia was very common in high school students and it was detected in more than half of the students even up to 80% (16). Similarly, curfews due to COVID-19 pandemic and online education may have increased the nomophobia. In present study, it was observed that poor sleep quality increased 3 times with severe nomophobia. In a previous study including the high school students, it was shown that the poor sleep quality was associated with internet addiction (2). The results of this study seem to be concordant with literature, considering that young people's internet use is mostly via mobile phones. Intervention efforts to reduce nomophobia will also contribute to improving sleep quality. For this purpose, installing the applications that focus on reducing the screen time on smart mobile phones may be useful (17). Also cognitive behavioral therapies can be effective (18). Additionally, awareness raising activities about nomophobia and its negative effects on high school students are essantial.

Conclusion

The frequency of poor sleep quality among high school students is in a considerably dramatic level. Female sex, having had flu or other upper respiratory tract infections and gastrointestinal disorders, being overweight and having nomophobia have been shown to increase poor sleep quality. Determining and periodically monitoring the sleep quality of high school students, defining problems and developing solutions, providing counseling on sleep hygiene expecially for risk groups and their families will improve sleep quality among high school students.

Ethics

Ethics Committee Approval: Niğde Ömer Halisdemir University Ethics Committee permission (protocol number: 2020/12-13 and date: 29/12/2020), institutional permission.
Informed Consent: Informed consent of the participants and their parents were obtained.
Peer-review: Externally and internally peer-reviewed.

Authorship Contributions

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