Original Article / *Özgün Makale*

DOI: 10.4274/jtsm.galenos.2022.42104

Journal of Turkish Sleep Medicine 2022;9:232-237

Effect of Internet Addiction on the Sleep Quality of Adolescents During COVID-19 Pandemia Duration Period

COVID-19 Pandemi Sürecinde Ergenlerde İnternet Bağımlılığının Uyku Kalitesine Etkisi

Esra Tural Büyük, Zeynep Öztürk Savaş

Ondokuz Mayıs University Faculty of Health Sciences, Department of Nursing, Samsun, Turkey

Abstract

Objective: This study was conducted to determine the effect of internet addiction on the sleep quality of adolescents during the Coronavirus (COVID) period.

Materials and Methods: This cross-sectional, descriptive, and correlational design study was conducted in the high schools located in a city center between March-June 2021. The universe of the study consisted of students aged between 13 and 18 years old and the study was completed with 413 students. Demographic information form, internet addiction scale for adolescents (IASA) and Pittsburgh sleep quality index (PSQI) were used to collect data. In order to evaluate the data, number, mean, percentile distributions, t-test, analysis of variance (ANOVA), Kruskal-Wallis test and Spearman correlation analysis tests were used in SPSS 21 statistical program.

Results: A total of 40.9% of the participants were found to spend 4-6 hours on the Internet during the pandemic and 85.2% had poor sleep quality. While the total mean scores obtained from the IASA was 20.30±8.87, it was 8.19±2.50 from the PSQI. The time spent daily on the Internet for non-educational purposes during COVID and the characteristics of the time spent on the internet compared to the pre-COVID period were significantly correlated with the mean total scores of IASA ($p<0.05$). A weak positive significant relationship was found between the total mean scores of the adolescents' IASA and PSQI scales ($r=0.216$, $p<0.000$).

Conclusion: In the study, more sleep problems were observed among the adolescents as their internet addiction levels increased throughout the study.

Keywords: Adolescents, COVID, pandemia, internet addiction, sleep quality

Öz

Amaç: Bu çalışmanın amacı, Koronavirüs (COVID) pandemisi sürecinde ergenlerde internet bağımlılığının uyku kalitesi üzerine etkisini belirlemektir.

Gereç ve Yöntem: Araştırma kesitsel, tanımlayıcı ve ilişki arayıcı tipte olup bir il merkezinde bulunan liselerde Mart-Haziran 2021 tarihleri arasında gerçekleştirilmiştir. Araştırmanın evrenini, bu liselerde eğitim gören 13-18 yaş aralığındaki öğrenciler oluşturmuş olup çalışma 413 öğrenci ile tamamlanmıştır. Verilerin toplanmasında tanıtıcı bilgi formu, internet bağımlılığı ölçeği ve Pittsburgh uyku kalitesi indeksi (PUKİ) kullanılmıştır. Verilerin değerlendirilmesi için, SPSS 21 istatistik programında sayı, ortalama, yüzdelik dağılımlar, t-testi, varyans analizi (ANOVA), Kruskal-Wallis testi ve spearman korelasyon analizi testlerinden yararlanılmıştır.

Bulgular: Pandemi sürecinde ergenlerin %40,9'unun günde 4-6 saat internette vakit geçirdiği ve %85,2'sinin kötü uyku kalitesine sahip olduğu saptanmıştır. Ergenlerin internet bağımlılığı ölçeği (İBÖ) toplam puan ortalamaları 20,30±8,87 ve PUKİ toplam puan ortalamaları 8,19±2,50 olarak saptanmıştır. COVID sürecinde eğitim amacı dışında günlük internet ile geçirilen süre ve COVID öncesi sürece göre internet ile geçirilen sürenin özelliği ile İBÖ toplam puan ortalamaları arasında istatiksel olarak anlamlı bir ilişki saptanmıştır ($p<0,05$). Ergenlerin İBÖ ve PUKİ ölçek toplam puan ortalamaları arasında anlamlı, pozitif yönde ve zayıf bir ilişki olduğu ($r=0,216$, $p<0,000$) saptanmıştır.

Sonuç: Ergenlerin internet bağımlılık düzeyleri arttıkça daha fazla uyku problemleri yaşadıkları görülmektedir.

Anahtar Kelimeler: Adölesan, COVID, pandemi, internet bağımlılığı, uyku kalitesi

Introduction

Internet has become an almost inevitable necessity used by almost everyone due to the convenience it provides in communication and access to information. Addiction risk increases as the time connected to internet increases (1,2). Internet addiction creates a risk especially for the children and adolescents. Internet is preferred by the adolescents since it provides a social, free and unlimited, mysterious, active and rewarding environment, provides an easy access and functions as an instrument enabling them to make themselves heard (1,3).

Despite the high rate of data flow and potential educational value, excessive use of the internet and internet addiction have been found to affect the physical health, family life and academic performance of the adolescents in a negative way

Address for Correspondence/Yazışma Adresi: Assoc. Prof. Esra Tural Büyük, Ondokuz Mayıs University Faculty of Health Sciences, Department of Nursing, Samsun, Turkey
Phone: +90 362 457 60 20 **E-mail:** esratural55@gmail.com **ORCID-ID:** orcid.org/0000-0001-8855-8460
Received/Geliş Tarihi: 16.12.2021 **Accepted/Kabul Tarihi:** 06.05.2022

(1,4). Sleep problems are among the negative effects of internet addiction on physical health (4,5). In the previous studies, the technological device, and problematic internet usage has been reported to be correlated with poor sleep quality and lead to adverse sleeping traits such as delay in falling asleep and daytime sleepiness (6,7). During the Coronavirus disease-2019 (COVID-19) pandemic, the sleep patterns of the adolescents were also altered due to the changes in their daily routines and they reported experiencing sleep problems during the pandemic (8,9). Moreover, internet usage characteristics and sleep states of the adolescents were determined to be negatively influenced due to the increase in time spent during the COVID-19 pandemic (10,11). Nurses have roles and responsibilities for the protection and promotion of children and adolescent health in hospitals, schools and the field of public health. In this context, it is important for the nurses to participate in multidisciplinary studies including the adolescents and families for the protection of children and adolescents from internet addiction, recognition of early addiction signs and rehabilitation (12,13). It is also suggested that determination of the effects of internet addiction on sleep quality would provide guidance to the studies aiming to determine and rehabilitate addiction at an early period and to improve sleep quality. There are a limited number of studies in the literature investigating the effect of internet addiction on sleep quality among adolescents during the COVID-19 pandemic.

In this study, it was aimed to investigate the effect of internet addiction on the sleep quality of adolescents during COVID period.

Research questions

What is the level of internet addiction among the adolescents during COVID-19 pandemic?

What is the level of sleep quality among the adolescents during COVID-19 pandemic?

Does internet addiction have an effect on sleep quality among the adolescents during COVID-19 pandemic?

Materials and Methods

Type of the study

The study had a descriptive, correlational and cross-sectional design.

The universe and sample of the study

The universe of the study consisted of 2454 students aged between 13-18 years old who were studying in the high schools located in a city center in Blacksea Region between March-June 2021. Target sample size of the study was determined to be 332 students with an error rate of 5% within a confidence interval of 95%; and the study was completed with 413 students.

Data collection instruments

"Demographic ınformation form" which was prepared by the researcher and included questions to determine socio-demographic data of the students, their technological device usage behaviors and sleep characteristics, "Internet addiction scale for adolescents (IASA)" and "Pittsburgh sleep quality index (PSQI)" were used to collect data in the study.

Demographic information form: This form was prepared by the researchers in line with the literature and consisted of a total of 12 questions for determining socio-demographic variables of the students (age, sex, education levels of parents, employment status of the mother, income status of the family) and their technological device and internet usage characteristics (1,8).

IASA: The validity and reliability study of the scale was conducted by Taş (14). The IASA consists of 9 items and one factor. The total score that can be obtained from the scale ranges from 0 to 45. It is a 5-point Likert type scale ("never", "rarely", "sometimes", "often" and "always"). There is no reverse-scored item on the scale. High scores that can be taken from the scale indicate a high level of internet addiction. Cronbach alpha internal consistency coefficient of the scale was 0.81 (14). Cronbach's alpha was found as 0.96 in this study.

PSQI: PSQI was developed by Buysse et al. (15) and adapted to Turkish by Agargun et al. (16). PSQI is composed of 24 questions evaluating sleep quality and disorder during the past one month. 19 questions are self-report questions and the other 5 are the questions to be answered by the spouse or roommate and excluded from scoring and they are evaluated for clinical information. Nineteen questions of the scale, that are scored, consist of 7 domains which are subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbance, sleep medication and daytime sleep dysfunction. Each domain is assessed over 0-3 points. Total scale score, that is total PSQI value, is obtained when the scores of all domains are summed up. The higher the score means there is a problem related to sleep. Total score varies between 0-21 points. A total score greater than 5 indicates a "poor sleep quality". Cronbach alpha value of the scale is 0.80 (16). It was found to be 0.74 in this study.

Data collection

School managers were met and they were informed about the aim of the study after all necessary ethics approval and institutional permissions were obtained to conduct this study at schools. Later on, students were instructed about the aim of the study in their class whatsapp groups through school managers and teachers. Then, a Google form was created and sent to the students to collect data of the study.

Ethical aspect of the study

Ethics approval of the study was taken from Social Sciences Research Ethics Committee of the Relevant University (date: 05.28.2021; no: 2021/487) and the institutional permission was taken from the National Education Directorate of the city where the study would be conducted. Managers of the relevant schools were met and they were informed about the aim of the study. Students were informed about the study in the first page of online link before filling out data collection instruments and they were asked to mark the statement as "I consent to participate in the study" if they approved to participate. The students who filled out the online form were deemed to have accepted to participate in the study. The confidentiality of the

answers of the students was ensured and they were only seen on Google forms via electronic mail which was defined on behalf of researchers.

Statistical Analysis

Data obtained in the study were analyzed by SPSS 22 (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.) program. At first, the Kolmogorov-Smirnov test was used for the normality assumption of data in the study. Numbers, percentages, mean, standard deviation and median were used for descriptive statistics. Parametric tests (independent samples t-test, One-Way variance analysis and Tukey post-hoc multiple comparison test) were used for the analyses of parametric data with normal distribution. Spearman correlation analysis was used to determine the correlation between the scores of the IASA and the PSQI. The results were accepted as statistically significant at a significance level of $p<0.05$ within a confidence interval of 95%.

Results

Mean age of the adolescents included in the study was 15.78±1.23 years old; 50.1% were between 15-16 years old and 51.1% were females. While 40.9% of the mothers were elementary school graduates, 25.4% of the fathers were found to be undergraduate and graduates. It was also found that 91.3% of the mothers were unemployed and 58.4% had an income equal to the expenses (Table 1).

While 64.9% of the adolescents stated that they had their own tablet/computer, 95.9% had a smartphone. A total of 40.9% of them reported spending 4-6 hours on the internet per day for non-educational purposes during the COVID-19 pandemic period and 58.3% told that the time they spent on the internet increased compared to the pre-COVID-19 period. While 72.4% of families were found not to put any restrictions on their children regarding the use of the internet during this period and 36.1% of the adolescents rarely had conflicts about the use of the internet (Table 2).

The total mean score of the adolescents from the IASA was found as 20.30±8.87. Moreover, their total mean score from PSQI was found as 8.19±2.50 and the mean scores of the domains of PSQI were found as 1.88±0.72 for subjective sleep quality, 1.88±1.56 for sleep latency, 1.45±0.58 for sleep duration, 0.46±0.80 for sleep efficiency, 1.65±1.07 for sleep disturbance, 0.06±0.31 for sleep medication and 0.82±0.84 for daily sleep dysfunction. A total of 85.2% of the adolescents had a total PSQI score greater than 5 and thus had a poor sleep quality (Table 3).

Total mean IASA scores were found to have statistically significant differences in terms of time spent on the internet for non-educational purposes during the COVID-19 period, the characteristics of the time spent on the internet compared to the pre-COVID-19 period and adolescent's status of experiencing conflicts with their families about internet usage ($p<0.05$). Besides, statistically significant differences were found in total mean PSQI scores in terms of adolescents' status of experiencing conflicts with their families about internet usage ($p<0.05$) (Table 4).

When the correlations between total IASA and PSQI and their domains in the study were examined, a significant, positive but

Table 1. Socio-demographic characteristics of the adolescents (n=413)

Variables		n	%
Age group	13-14 years old	68	16.5
	15-16 years old	207	50.1
	17-18 years old	138	33.4
Sex	Female	211	51.1
	Male	202	48.9
Education level of the mother	Elementary school	169	40.9
	Secondary school	56	13.6
	High school	105	25.4
	Undergraduate and higher	83	20.1
Education level of the father	Elementary school	124	30.1
	Secondary school	81	19.6
	High school	103	24.9
	Undergraduate and higher	105	25.4
Employment status of the mother	Unemployed	377	91.3
	Employed	36	8.7
Income status of the family	Income less than expenses	75	18.2
	Income equal to expenses	241	58.4
	Income more than expenses	97	23.5

Table 2. Technological devices owned by the adolescents and their internet usage features (n=413)

Variables		n	%
Status of having own tablet/computer	Yes	268	64.9
	No	145	35.1
Status of having own smartphone	Yes	396	95.9
	No	17	4.1
Time spent on the internet during COVID period out of educational purpose	1-3 hours	123	29.8
	4-6 hours	169	40.9
	7-10 hours	89	21.5
	11 hours and more	32	7.7
The feature of the time spent on the internet compared to pre-COVID period	Time spent on the internet increased	241	58.3
	No change	109	26.4
	Time spent on the internet decreased	63	15.3
Status of family about bringing restrictions to internet usage	Yes	114	27.6
	No	299	72.4
Status of experiencing conflicts with the family about internet usage	Never	98	23.7
	Rarely	149	36.1
	Sometimes	112	27.1
	Often	42	10.2
	Always	12	2.9

COVID: Coronavirus

Table 3. Mean IASA and PSQI scores and sleep quality percentage rates of the adolescents		
	Mean ± SD	**(Min-max)**
Total IASA	20.30±8.87	9-43
Total PSQI	8.19±2.50	2-15
Subjective sleep quality	1.88±0.72	0-3
Sleep latency	1.88±1.56	0-6
Sleep duration	1.45±0.58	1-3
Sleep efficiency	0.46±0.80	0-3
Sleep disturbance	1.65±1.07	0-3
Sleep medication	0.06±0.31	0-3
Daily sleep dysfunction	0.82±0.84	0-3
PSQI Good sleep quality n (%): 61 (14.8) Poor sleep quality n (%): 352 (85.2)		
SD: Standard deviation, IASA: Internet addiction scale for adolescents, PSQI: Pittsburgh sleep quality index		

weak correlation was found between total scale scores (r=0.216, p<0.000). IASA scale was found to have a significant, positive but very weak correlations with 2nd (r=0.173, p<0.000), 3rd (r=0.024, p<0.000) and 6th (r=0.057, p<0.05) and a significant, negative and weak correlation with 1st domain of PSQI (r=-0.303, p<0.000) (Table 5).

Discussion

In the study, the majority of the adolescents were found to spend more time on the internet compared to the pre-COVID-19 period and their internet addiction levels were found to increase as time spent on the internet per day increased (Tables 2, 3). Many national and international studies conducted during the pandemic found that children spent more time with technological devices (2,8). Zengin et al. (8) reported that 36.6% of the children spent 3-4 hours and 32.0% spent more than 4 hours with television,

Table 4. Some technological device and ınternet usage features of the adolescents during COVID and their total mean IASA and PSQI scores					
		IASA		**PSQI**	
		Mean ± SD	**Test statistic (F, t) p**	**Mean ± SD**	**Test statistic (F, t) p**
Time spent on the internet out of education during COVID period	1-3 hours	17.45±7.73 (a)	13.672 **0.000**	8.20±2.46	0.101 0.959
	4-6 hours	19.83±8.26 (ab)		8.21±2.50	
	7-10 hours	22.73±9.30 (b)		8.08±2.51	
	11 hours and more	26.91±10.03 (b)		8.34±2.68	
The feature of the time spent on the internet compared to pre-COVID period	Time spent on the internet increased	21.23±9.15 (a)	6.233 **0.002**	8.39±2.60	2.824 0.061
	No change	21.13±8.60 (a)		8.25±2.24	
	Time spent on the internet decreased	17.75±7.93 (b)		7.71±2.35	
Status of experiencing conflicts with the family about internet usage	Never	16.61±8.01 (a)	12.532 **0.000**	7.32±2.44 (a)	5.887 **0.000**
	Rarely	19.27±8.12 (a)		8.26±2.42 (b)	
	Sometimes	22.30±8.86 (b)		8.34±2.50 (b)	
	Often	25.05±9.17 (b)		9.12±2.24 (b)	
	Always	27.75±8.25 (b)		9.67±2.77 (b)	
SD: Standard deviation, IASA: Internet addiction scale for adolescents, PSQI: Pittsburgh sleep quality index, COVID: Coronavirus					

Table 5. The correlations between sleep quality and ınternet addiction scale scores of the adolescents								
IASA	**PSQI total and subscales**							
	PSQI	**Subjective sleep quality**	**Sleep latency**	**Sleep duration**	**Sleep efficiency**	**Sleep disturbance**	**Sleep medication**	**Daily sleep dysfunction**
	r	**r**	**r**	**r**	**r**	**r**	**r**	
r	0.216*	-0.303*	0.173*	0.024*	**-0.003**	**0.107**	**0.057****	**0.407**
p	0.000	0.000	0.000	0.000	**0.632**	**0.959**	**0.030**	**0.252**
*p<0.01, **p<0.05, PSQI: Pittsburgh sleep quality index, (r=0.00 to 0.25 very weak correlation, r=0.26 to 0.49 weak correlation, r=0.50 to 0.69 moderately good correlation, r=0.70 to 0.89 high correlation, and r=0.90 to 1.00 very high correlation), PSQI: Pittsburgh sleep quality index, IASA: Internet addiction scale for adolescents								

tablet or phones per day during the COVID-19 pandemic. Moreover, Dong et al. (17) indicated that the rate of using technological devices all day was 27% among the children and adolescents before the pandemic whereas this rate increased another 50% during the pandemic. These results show that adolescents spent more time with technological devices during the pandemic since they stayed at home. The time spent on the internet for no reason is a significant factor in the diagnosis of internet addiction and the increase in this time causes addiction (5). The studies which have been carried out since the emergence of the COVID-19 pandemic have revealed an increase in the duration of using technological devices. This situation also increases the risk of developing internet addiction.

It was determined that adolescents, who had conflicts with their parents about the use of internet, experienced more internet addiction and sleep problems (Table 4). Previous studies have shown that adolescents, who have a quality relationship with their parents, have less internet addiction (1,18). Moreover, excess use of internet has been observed among the adolescents as parental surveillance is decreased (19,20). Again, negative factors such as domestic violence and some parental attitudes (indifferent, authoritarian and protective parents) have been reported to be effective on internet addiction among the adolescents (1,18,20). These results show that parental role is important in controlling internet usage of adolescents and the characteristic of the communication between adolescent and the parent and parental attitudes might be effective on internet addiction.

In the current study, most of the adolescents were found to have poor sleep quality (Table 3). In many studies conducted with adolescents before the COVID-19 pandemic, their sleep quality was found to be poor (7,21). Also, the studies, which were conducted with adolescents during the COVID-19 pandemic period, showed that their sleep quality was affected negatively due to the pandemic, their sleeping habits changed, they slept later, daytime sleepiness increased and sleep quality was disturbed (8,22).

In the study, it was also observed that adolescents experienced more sleep problems as their internet addiction levels increased (Table 5). Previous studies have shown that sleep problems are associated with problematic internet usage (23,24). The study by Chen and Whu (25) reported in their study, which was carried out with the same adolescent group at two different times before and after pandemic, that the temporal relationships between sleep problems and problematic smartphone use are reciprocal. In the study by Masthi et al. (26), it was indicated that the group with social media addiction experienced more sleep problems. Koças and Şaşmaz (7) identified internet addiction as the factor that alleviated sleep quality among the high school students. In the study by Sulun et al. (5), it was revealed that daytime sleepiness increased as the risk of smartphone addiction increased among the adolescents. In their study with students, Kootesh et al. (27) stated that internet addicted group had a poor sleep quality. Moreover, many studies have reported that internet- and online game-addicted adolescents have more sleep problems compared to those who are not (28,29).

Study Limitations

The conduction of the study in a single city center and the interpretation of the results based on self-report of the students were the limitations of the current study.

Conclusion

It was found in this study that most adolescents spend more time on the internet compared to the pre-COVID-19 pandemic period and this situation increased their internet addiction levels. It was also determined that their sleep quality was negatively affected during the pandemic. Moreover, adolescents in the study were found to have more sleep problems as their internet addiction levels increased.

Internet addiction, that is among the significant causes of sleep disorders seen among the adolescents, has gained more importance during the pandemic. As in other addiction types, studies should be carried out to rehabilitate adolescents and to improve the quality of their sleeping activity in internet addiction. It is important for the nurses working in the fields of community and pediatric health to participate in educational studies aiming conscious and safe use of internet to enhance awareness on internet addiction among the children, adolescents and families. Moreover, nurses should counsel adolescents and families especially during the pandemic period in order to prevent addiction or decrease internet use by recognizing physical problems such as sight problems, headache and sleep problems that may occur in adolescents as a result of internet addiction. Struggling with internet addiction of adolescents, who are the future of the society, will improve life quality and well-being level of whole society.

Acknowledgments

The authors would like to thank all the adolescents who participated in the study voluntarily.

Ethics

Ethics Committee Approval: Ethics approval of the study was taken from Social Sciences Research Ethics Committee of the Relevant University (date: 05.28.2021; no: 2021/487) and the institutional permission was taken from the National Education Directorate of the city where the study would be conducted.
Informed Consent: Informed consent was obtained.
Peer-review: Externally peer-reviewed.

Authorship Contributions

Concept: Z.Ö.S., Design: E.T.B., Data Collection or Processing: Z.Ö.S., E.T.B., Analysis or Interpretation: Z.Ö.S., E.T.B., Writing: E.T.B.
Conflict of Interest: No conflict of interest was declared by the authors.
Financial Disclosure: The authors declared that this study received no financial support.

References

1. Taş İ. The examination of internet addiction and psychological symptoms among adolescents according to various variables. Journal of Social Sciences of Mus Alparslan University 2018;6:31-41.
2. Baltacı Ö, Akbulut ÖF, Zafer R. COVID-19 Pandemisinde Problemli İnternet Kullanımı: Bir Nitel Araştırma. Kırşehir Ahi Evran Üniversitesi Sağlık Bilimleri Enstitüsü Dergisi 2020;3:126-40.
3. Canoğulları Ö, Güçray SS. Examination of adolescents with different levels of internet addiction in terms of psychological needs according to gender, social anxieties and perception of parental attitudes. Ç.Ü. Sosyal Bilimler Enstitüsü Dergisi 2017;26:42-57.
4. Mustafaoğlu R, Yasacı Z. The negative effects of digital game playing on children's mental and physical health. Journal of Dependence 2018;19:51-8.
5. Sulun A, Gunay U, Sarman A, Dertli S. Daytime sleepiness in adolescents using smartphone. Journal of Dependence 2020;21:129-36.
6. Tokiya M, Itani O, Otsuka Y, Kaneita Y. Relationship between internet addiction and sleep disturbance in high school students: A cross-sectional study. BMC Pediatr 2020;20:379.
7. Koças F, Şaşmaz T. Internet addiction increases poor sleep quality among high school students. Turk J Public Health 2018;16:167-77.
8. Zengin M, Yayan EH, Vicnelioğlu E. The effects of the COVID-19 pandemic on children's lifestyles and anxiety levels. J Child Adolesc Psychiatr Nurs 2021;34:236-42.
9. Bruni O, Malorgio E, Doria M, Finotti E, Spruyt K, Melegari MG, Villa MP, Ferri R. Changes in sleep patterns and disturbances in children and adolescents in Italy during the Covid-19 outbreak. Sleep Med 2022;91:166-74.
10. Xiang M, Zhang Z, Kuwahara K. Impact of COVID-19 pandemic on children and adolescents' lifestyle behavior larger than expected. Prog Cardiovasc Dis 2020;63:531-2.
11. Guan H, Okely AD, Aguilar-Farias N, Cruz BP, Draper CE, El Hamdouchi A, Florindo AA, Jáuregui A, Katzmarzyk PT, Kontsevaya A, Löf M, Park W, Reilly JJ, Sharma D, Tremblay MS, Veldman SLC. Promoting healthy movement behaviours among children during the COVID-19 pandemic. The Lancet Child Adolesc Health 2020;4:416-8.
12. Uysal G, Balci S. Evaluation of a school-based program for internet addiction of adolescents in Turkey. J Addict Nurs 2018;29:43-9.
13. Kaya A, Dalgiç İşler A. How does Internet Addiction Affect Adolescent Lifestyles? Results from a School-Based Study in the Mediterranean Region of Turkey. J Pediatr Nurs 2018;59:e38-e43.
14. Taş İ. Internet addiction scale for adolescents: Validity and reliability study. KEFAD 2019;20:875-905.
15. Buysse DJ, Reynolds CF, Monk TH. The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. Psychiatry Res 1989;28:193-213.
16. Agargun MY, Kara H, Anlar O. The validity and reliability of the Pittsburgh Sleep Quality Index. Turkish Journal of Psychiatry 1996;7:107-11.
17. Dong H, Yang F, Lu X, Hao W. Internet addiction and related psychological factors among children and adolescents in China during the Coronavirus Disease 2019 (COVID-19) Epidemic. Front Psychiatry 2020. doi: 10.3389/fpsyt.2020.00751
18. Özdemir Y, Kuzucu Y, Ak Ş. Examining compulsive internet use of adolescents based on adolescents' and parents' reports. Elementary Education Online 2016;15:340-3.
19. Martins MV, Formiga A, Santos C, Sousa D, Resende C, Campos R, Nogueira N, Carvalho P, Ferreira S. Adolescent internet addiction – role of parental control and adolescent behaviours. Int J Pediatr Adolesc Med 2020;7:116-20.
20. Zhang R, Bai B, Jiang S, Yang S, Zhou Q. Parenting styles and internet addiction in Chinese adolescents: Conscientiousness as a mediator and teacher support as a moderator. Computers in Human Behavior 2019;101:144-50.
21. Tekcan P, Çalişkan Z, KocaÖz S. Sleep quality and related factors in turkish high school adolescents. J Pediatr Nurs 2020;55:120-5.
22. Nakayama H, Matsuzaki T, Mihara S, Kitayuguchi T, Higuchi S. Change of internet use and bedtime among junior high school students after long-term school closure due to the Coronavirus Disease 2019 Pandemic. Children (Basel) 2021;8:480.
23. Tan Y, Chen Y, Lu Y, Li L. Exploring associations between problematic internet use, depressive symptoms and sleep disturbance among southern Chinese adolescents. Int J Environ Res Public Health 2016;13:313.
24. Sohn SY, Krasnoff L, Rees P, Kalk NJ, Carter B. The association between smartphone addiction and sleep: A UK cross-sectional study of young adults. Frontiers in Psychiatry 2021. doi: 10.3389/fpsyt.2021.629407
25. Chen JK, Wu WC. Reciprocal relationships between sleep problems and problematic smartphone use in Taiwan: Cross-lagged panel study. Int J Environ Res Public Health 2021. doi: 10.3390/ijerph18147438
26. Masthi NNR, Pruthvi S, Mallekavu P. A comparative study on social media addiction between public and private High School students of urban Bengaluru, India. ASEAN Journal of Psychiatry 2017:18:206-15.
27. Kootesh BR, Raisi M, Ziapour A. Investigation of relationship internet addict with mental health and quality sleep in students. Acta Medica Mediterranea 2016;32:1921-5.
28. Rehbein F, Kliem S, Baier D, Mößle T, Petry NM. Prevalence of Internet gaming disorder in German adolescents: Diagnostic contribution of the nine DSM-5 criteria in a state-wide representative sample. Addiction 2015;110:842-51.
29. Männikkö N, Billieux J. Kääriäinen M. Problematic digital gaming behavior and its relation to the psychological, social and physical health of Finnish adolescents and young adults. J Behav Addict 2015;4:281-8.