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Adolescents' Sleep Habits, Internet Use and Changing Sleep-Wake Schedule

Adolesanların Uyku Alışkanlıkları, İnternet Kullanımları ve Değişen Uyku-Uyanıklık Düzeni

Songul Caglar[1], Makbule Tokur Kesgin[1], Bedriye Ak[1]

[1]Bolu Abant İzzet Baysal University, Department of Nursing, Public Health Nursing, Inst. of Health Sciences, Bolu, Turkey.
[2]Bolu Abant İzzet Baysal University, Dep. of Nursing, Child Health and Disease Nursing, Inst. of Health Sciences, Bolu, Turkey.

Abstract

Objective: The physical and psychological changes experienced during adolescence can change the sleep pattern. However, unconsciously use of internet by adolescents can lead to some problems on sleeping habits. The aim of this study was to investigate the relationship between sleep habits and internet use and changing sleep-wake schedule in adolescents.

Material-Method: A cross-sectional study was conducted. The participants were 1498 secondary school students aged 10-14. Sleep habits and internet use and changing sleep-wake schedule were assessed using a questionnaire which was by prepared through by the researchers.

Results: Of the 1498 participants, 48.5% had sleep problems and the most common sleep problem was difficulty on falling asleep (43.5%). 94.9% of adolescents were used internet and they mostly were spent 1.5-2 hours in internet. It was determined to delay timing of sleep due to use of internet 23.6% of adolescents who used internet and majority of their families (73.9%) had complaints about the negative effects of internet use on sleep. Adolescents' sleep problems were found to be associated with delaying the timing of sleep due to internet use ($p<0.05$). Also, adolescents' internet use was associated with fall asleep duration ($p<0.05$).

Conclusions: Internet use creates various problems in adolescents' fall asleep duration and sleep hours when it is used without family control and in a long duration.

Keywords: Adolescent, Circadian Rhythm, Internet, Sleep, Sleep-Wake, Sleep-Wake Schedule Disorders.

Özet

Amaç: Adolesan dönemde yaşanan fiziksel ve psikolojik değişiklikler uyku düzenini değiştirebilir. Bununla birlikte adolesanların bilinçsiz internet kullanımı da uyku alışkanlıklarında bazı sorunlara yol açabilir. Bu çalışmanın amacı adolesanların uyku alışkanlıkları ve internet kullanımları arasındaki ilişkiyi ve değişen uyku-uyanma düzenini incelemektir.

Materyal-Metot: Çalışma kesitsel tipte planlanmıştır. Çalışmaya 10-14 yaşlarında 1498 ortaokul öğrencisi katılmıştır. Öğrencilerin uyku alışkanlıkları, internet kullanımları ve değişen uyku-uyanıklık düzeni araştırmacılar tarafından hazırlanan bir anket ile değerlendirilmiştir.

Bulgular: Öğrencilerin %48,5'inin uyku problemi vardır ve en yaygın görülen uyku problemi uykuya dalmada zorluktur (%43,5). Adolesanların %94,9'u internet kullanmaktadır ve çoğunlukla 1,5-2 saatlerini internette geçirmektedirler. İnternet kullanan adolesanların %23,6'sı internet kullanımları sebebiyle uykularını geciktirmektedir ve internet kullanan adolesanların ailelerinin çoğu internetin uyku üzerine olumsuz etki ettiğinden şikayet etmektedir. Adolesanların uyku problemleri internet kullanımından kaynaklanan uyku saatinin geciktirilmesi ile ilişkilidir ($p<0,05$). Ayrıca, adolesanların internet kullanımları uykuya dalma süreleri ile de ilişkilidir ($p<0,05$).

Sonuç: Aile kontrolü olmadan ve uzun süre internet kullanımı adolesanların uykuya dalma süreleri ve toplam uyku saatleri üzerinde çeşitli sorunlara yol açmaktadır.

Anahtar kelimeler: Adölesan, İnternet, Uyku, Uyku-Uyanıklık, Uyku-Uyanma Düzeni Bozuklukları.

Introduction

World Health Organization defines 10-19 age group as adolescence period (1). Adolescence period is a transitional period in which physical and spiritual changes occur that environmental stressors, risky behaviours and psychosocial necessities (2). This period is a critical for adolescents in terms of their health conditions since they experience a fast development and have different necessities (3, 4). Their health conditions should be improved, disease risks should be reduced and their health should be maintained for the long term in this period (5). In accordance with this purpose, a healthy sleep pattern is essential for physical, cognitive and intellectual development in an adolescent life (6). Sleep affects not only adolescents' physical growth and academic performance but also their thinking, behaviour and emotional abilities in considerable ways (3, 7). Adolescents who do not get adequate sleep are known to have daytime sleepiness and careless behaviour, behavioural problems,

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Yazışma Adresi / Corresponding: Songul Caglar,
Bolu Abant İzzet Baysal University, Bolu Health College, Gölköy Campus Room 114, Bolu, Turkey.
Tel: +90 374 253 45 20
Fax: +90 374 253 45 57
E-posta / E-mail: songulcaglar@ibu.edu.tr

and academic failure (8, 9) Some studies have found that biological changes, family supervision, social activities, stress, school life, use of media and environmental changes, which are experienced in adolescence period, are the factors that affect adolescents' sleep pattern (6, 10). Sleep patterns and sleep habits might be changed due to the factors including irregular sleep hours in school days, changing sleep hours during weekends, increasing the amount of time spent on computer and television (3, 11). Internet usage especially increases toward adolescence period from pre-adolescence period (12). Previous studies showed that adolescents who spend more time on the internet delayed their sleeping hours, slept more late on weekdays and weekends, took less sleep during the day and had more fatigue during the day (13-16). Therefore, internet usage increases the intellectual, emotional and physiological triggers and affects negatively their sleep quality due to the factors such as more exposure to bright light (17). Adolescents' internet usage and sleep problems have increased the necessity of elucidating the effects of internet use habits on sleep patterns and in order to take under control of these problems (14, 18, 19). Most previous studies on adolescents' internet use and sleep patterns are outside the discipline of nursing. It is necessary to evaluate the habits of sleeping and internet usage of adolescents especially in order that school nurses can provide good health care. The aim of this study was to investigate the associations between adolescents' sleep habits and internet use and changing sleep patterns.

Material and Methods

This cross-sectional descriptive study was conducted in 2014-2015 academic year. Participants constituted of 5th, 6th and 7th grades students in 35 schools in the province center (total 9434). Universal sampling method was used in order to determine the sample size (20). National Sleep Foundation (NSF) claimed that 50% of adolescents had a good level of sleep quality (21). Therefore, p in the formula (observation frequency to be analyzed) was considered as 0.5. In the formula, standard error value (d) and observation frequency (p) were used as 0.03 and 0.05 respectively thus the number of adolescents was calculated as 1546 for sampling. The students who studied in 5th, 6th and 7th grades from 5 secondary schools, which were selected with basic random sampling method, were included into the study. Grade 8 students were found to be stressed to take the high school entrance exams. These students were not included in the study because stress was also an important variable on adolescents sleeping habits. 21 adolescents were absent during survey days and data obtained from 27 adolescents were considered as invalid because of missing data. Finally, the study was conducted with 1498 adolescent (male:753, female:745).

The data of the present study was collected using the data collection form, which was created by the researchers. The questionnaire, stemmed from the literature research, was composed of 47 closed-ended questions related to personal information and demographic characteristic, characteristics of sleeping habits and characteristics of internet use habits of adolescents. The questionnaire was pretested in with totally 30 adolescents as 10 students from each of 5th, 6th and 7th grades from a secondary school, who were not the part of final survey. Necessary changes were made in the form after pre-test. Participants completed a questionnaire in school classes while being supervised by teachers. The study was approved by ethics committee of social sciences from university (OR:2015/19) and Provincial National Education Directorate (OR:93554413/605/3047474). Study objectives were explained to students then written informed consent was obtained from each participant prior to the survey.

Categorical variables were described by frequency and percentage and continuous variables by mean and standard deviation. The associations in adolescent's demographic characteristic and internet use habits according to the sleep habits were calculated using the chi-square test and fisher exact tests. P value of less than 0.05 was set as the level of statistical significance.

Results

1498 adolescents were included in the study. Adolescents grade distribution was as follows; 5th grade: 436, 6th grade: 540 and 7th grade 522. Adolescents' age range was between 10 and 14 (mean±SD=11.9±0.9 ages). 64.0% of the adolescents claimed that their school success was good. Adolescents had a nuclear family type (79.5%), their economic conditions were good (50.6%) and more than half of them shared their rooms with other family members although they had their own rooms (62.3%).

Adolescents' Sleep Habits

Adolescent's falling asleep duration varied between 5-10 min. (36.5%) and 15-20 min. (34.8%). On the other hand, the rate of adolescents whose fall asleep duration exceeded 30 min. was 16.9%. Nearly half of the students (48.5%) stated that they had sleep problems and the most common sleep problem was found as difficulty on fall asleep (43.5%), having nightmare (32.6%) and sleepiness during the day (21.0%). Adolescents stated that they sometimes (at a rate of 69.8%) had these problems while considering their sleep quality as very bad 3.1%, bad 10.7%, good 54.3% and very good 31% (Table 1).

Table 1. Adolescents' sleep habits

	n	%
Fall asleep duration		
5-10 min.	546	36.4
15-20 min.	521	34.8
30 min.	178	11.9
Over 30 min.	253	16.9
Total	**1498**	**100.0**
Sleep quality		
Very bad	48	3.2
Bad	160	10.7
Good	813	54.3
Very Bad	477	31.8
Total	**1498**	**100.0**

Sleep problems		
Yes	726	48.5
No	772	51.5
Total	**1498**	**100.0**
Type of sleep problems		
Difficulty on Fall Asleep	316	43.5
Having Nightmare	237	32.6
Fall Asleep During a Day	152	21.0
Insufficient Sleep	134	18.4
Lack of Sleep	124	17.1
Frequent Awakening	92	12.7
Excess Sleep	74	10.2
Snoring	56	7.7
Sleepwalking	51	7.0
Teeth Grinding	47	6.5
Asphyxia	47	6.5
Other (Xerostomia, sleep talking etc.)	36	5.0
Total	**1366**	**100.0**
Frequency of having sleep problems		
Sometimes	507	69.8
Often	153	21.1
Usually	66	9.1
Total**	**726**	**100.0**
Total sleep duration in weekdays		
Less than 8 hours	304	20.3
8-9 hours	255	17.0
More than 9 hours	939	62.7
Total	**1498**	**100.0**
Total sleep duration at weekends		
Less than 8 hours	126	8.4
8-9 hours	91	6.1
More than 9 hours	1279	85.4
Total	**1498**	**100.0**
Feeling tired in a day		
Sometimes	1030	68.8
Never	205	13.7
Often	179	11.9
Usually	84	5.6
Total	**1498**	**100.0**
Electronic devices in sleeping rooms		
Yes	1232	82.2
No	266	17.8
The amount of time spent on tv, pc, mobile phone etc. in a day		
Less than 30 min.	203	13.6
30 min-1 hour	315	21.0
1,5-2 hours	416	27.8
2,5-3 hours	247	16.5
3,5-4 hours	130	8.7
More than 4 hours	187	12.5
Total	**1498**	**100.0**

*More than one answers were given. The percentages were calculated depending on the total number.
**The percentages were calculated depending on the total number of attendees who had sleep problems.

Adolescents' Internet Use Habits

Almost all of adolescents (94.9%) used internet. 28.7% of adolescents stated that they spent 1.5-2 hours on internet. While 27.4% adolescent's stated as time spends on internet between 30 minute and one hour. On the other hand, the rate of internet use during more than 4 hours was found at only 6.3%. 85.4% of families put limitations on adolescents' internet use and most adolescents (78.7%) abided by the limitations. 23.6% of adolescents who used the internet was determined to delay the timing of sleep due to use of internet and majority of their families (73.9%) had complaints about the negative effects of internet use on sleep (Table 2).

Table 2. Adolescents' internet use habits

	n	**%**
Internet Use Location		
Home	1302	88.3
Everywhere (Those who use internet in all location)	91	6.2
Cafe	69	4.7
Library	8	0.5
Parent's Workplace	4	0.3
Total **	**1474**	**100.0**
Internet Access Devices		
Mobile Phone	1010	32.5
Laptop	707	22.8
Desktop	704	22.7
Tablet	662	21.3
TV	21	0.7
Total*	**3104**	**100.0**
Internet use purpose		
Studying	694	31.7
All of Above	576	26.3
Playing Games	372	17.0
Facebook	330	15.0
Chats	145	6.6
Other (Watching a Match, Video etc.)	74	3.4
Total*	**100**	**100**
Parental internet use limitations		
Yes	1213	85.4
No	208	14.6
Total **	**1421**	**100.0**
Obeying the Limitations		
Yes	955	78.7
No	258	21.3
Total**	**1213**	**100.0**
Internet use		
Yes	1421	94.9
No	77	5.1
Total	**1498**	**100.0**

Internet use		
Yes	1421	94.9
No	77	5.1
Total	1498	100.0
Internet use frequency		
Everyday	654	43.7
2-3 days / week	521	34.8
1 day / week	171	11.4
1 day / month	38	2.5
Other (During Homework)	37	2.5
Total*	**1421**	**100**
The amount of time spent in internet		
Less than 30 min.	313	20.9
30 min.-1 hour	410	27.4
1.5-2 hours	430	28.7
2.5 -3 hours	181	12.1
3,5-4 hours	70	4.7
More than 4 hours	94	6.3
Total	**1421**	**100.0**

* The percentages were calculated depending on the total number of attendees who used internet.
** More than one answers were given. The percentages were calculated depending on the total number.

Sleep Problems and Internet Use in Association with Adolescents' Demographic Characteristics

There was a significant difference among internet use and number of electronic devices in adolescent's rooms and parent's educational background ($p<0.05$). It was found that sleep problems among adolescents depended on gender and grades. The difference between these groups was significant ($p<0.05$). However, internet use was not found to be associated with gender and grades ($p>0.05$). Both of internet use and sleep problems were found to be associated with economic conditions, school success, family type, having a separate room and parent's educational background ($p<0.05$) (Table 3).

Sleep Problems and Internet Use in Association with Adolescents'

Adolescents' sleep problems were found to be associated with delaying the timing of sleep due to internet use, the complaints of parents related to negative effects of internet use on sleep and the effects of internet use duration on daily life, thus the difference between the groups was significant ($p<0.05$). On the other hand, adolescents' internet use was not found to change depending on having sleep problems ($p>0.005$). Adolescents' sleep problems were not found to change depending on internet use frequency, parental limitations on the internet and adolescents' internet use by obeying such limitations ($p>0.005$) (Table 4).

Table 4. Adolescents' sleep problems in associated with internet use habits

	Sleep Problems				
	Yes		No		Statistical Analysis
	n	%	n	%	
Internet use frequency					
Everyday	316	48.1	341	51.9	x^2: 11.269 p: 0.46 df : 5
2-3 days / week	245	46.9	277	53.1	
1 day / week	92	52.3	84	47.7	
1 day / month	28	73.7	10	26.3	
Other	14	50.0	14	50.0	
Parental Limitations on Internet					x^2: 0.252 p: 0.882 df :2
Yes	591	41.6	104	7.3	
No	622	43.8	104	7.3	
Obeying the Limitations					x^2: 4. 248 p: 0.120 df: 2
Yes	451	37.1	504	41.5	
No	141	11.6	118	9.7	
Timing of Sleep Delays Due to Internet Use					x^2: 29.486 p<0.001 df: 2
Yes	207	61.8	488	44.8	
No	128	38.2	598	55.2	
Parent's **Complaints About the Negative Effects of Internet Use Duration on Sleep**					x^2: 38.928 p<0.001 df: 2
Yes	233	62.8	462	44.0	
No	138	37.2	588	56.0	

*Fisher test results were used

Table 3. Sleep problems and internet use in association with adolescents' demographic characteristics

Adolescents' Demographic Characteristics	Sleep Problems					Use of Internet				
	Yes		No		Statistical Analysis	Yes		No		Statistical Analysis
	n	%	n	%		n	%	n	%	
Gender					**x^2: 8.054 p: 0.005 df: 1**					x^2: 0.288 p: 0. 591 df: 1
Girl	391	53.5	354	46.2		709	49.9	36	46.8	
Boy	340	46.5	413	53.8		712	50.1	41	53.2	
Grades					**x^2: 11.611 p: 0.003 df: 2**					x^2: 4. 933 p: 0.085 df: 2
5th	221	30.2	215	28.0		408	28.7	28	36.4	
6th	286	39.2	254	33.1		509	35.8	31	40.3	
7th	224	30.6	298	38.9		504	35.5	18	23.3	
Economic Conditions					**x^2: 8.154 p: 0.043 df: 3**					**x^2: 27.965 p: 0. 001 df: 3**
Bad	23	3.1	10	1.3		27	1.9	6	7.8	
Normal	208	28.5	234	30.5		405	28.5	37	48.1	
Good	380	52.0	378	49.3		732	51.5	26	33.8	
Very Good	120	16.4	145	18.9		297	18.1	8	10.3	
School Success					**x^2: 8.421 p: 0.038 df: 3**					**x^2: 12.912 p: 0.005 df: 3**
Very Bad	3	0.4	1	0.1		4	0.3	0	0.0	
Bad	33	4.5	21	2.7		47	3.3	7	9.1	
Good	480	65.7	478	62.4		902	63.5	56	72.7	
Very Good	215	29.4	267	34.8		468	32.9	14	18.2	
Family type					**x^2: 14.010 p: 0.001 df: 2**					**x^2: 7.026 p: 0.030 df: 2**
Nuclear Family	553	75.7	638	83.2		1124	79.1	67	87.0	
Separated Family	49	6.7	29	3.8		72	5.1	6	7.8	
Extended Family	129	17.6	100	13.0		225	15.8	4	5.2	
The number of electronic devices in their sleeping rooms										
None	115	15.7	143	18.6	x^2: 5.906 p: 0.315 df: 5	223	15.7	35	45.5	**x^2: 60.009 p: 0.001 df: 5**
1	248	34.0	253	33.0		470	33.1	31	40.3	
2	162	22.2	187	24.4		341	24.0	8	10.4	
3	142	19.4	120	15.6		259	18.2	3	3.8	
4	47	6.4	48	6.3		95	6.7	0	0.0	
5	17	2.3	16	2.1		33	2.3	0	0.0	
Mother Education					x^2: 11.719 p: 0.069 df: 6					**x^2: 36.142 p: 0.001 df: 6**
Illiterate	20	2.7	15	2.0		29	2.0	6	7.8	
Literate	31	4.2	32	4.2		62	4.4	1	1.3	
Primary School Graduate	234	32.1	242	31.5		435	30.6	41	53.2	
Secondary School Graduate	174	23.8	147	19.2		304	21.4	17	22.1	
High School Graduate	181	24.8	195	25.4		368	25.9	8	10.4	
University Graduate	87	11.9	130	16.9		213	15.0	4	5.2	
Other (master etc.)	4	0.5	6	0.8		10	0.7	0	0.0	
Father Education					**x^2: 23.648 p: 0.001 df: 7**					**x^2: 66.337 p: 0.001 df: 7**
Illiterate	7	0.8	4	0.5		7	0.5	3	3.9	
Literate	36	5.0	26	3.4		58	4.1	4	5.2	
Primary School Graduate	162	21.9	123	16.3		255	17.9	30	39.0	
Secondary School Graduate	152	20.9	145	18.8		276	19.4	21	27.2	
High School Graduate	224	30.7	260	33.8		472	33.3	12	15.6	
University Graduate	149	20.4	198	25.8		340	23.9	7	9.1	
Other (master etc.)	2	0.3	11	1.4		13	0.9	0	0.0	

*Fisher test results were used.

Table 5. Adolescents' internet use in associated with sleep problems

	Internet Use				Statistical Analysis
	Yes		No		
	n	%	n	%	
Fall Asleep Duration					
5-10 min.	506	33.8	40	2.7	x^2: 10.155 p: 0.038 df : 4
15-20 min.	499	33.3	22	1.5	
30 min.	175	11.7	3	0.2	
More than 30 min.	241	16.1	12	0.8	
Insomnia					
Once	488	32.6	19	1.3	x^2: 3.972 p: 0.410 df: 4
Twice	211	14.1	13	0.9	
Three Times	68	4.5	3	0.2	
More than 3 Times	45	3.0	4	0.3	
Never	609	40.7	38	2.5	
Feeling Tired and Sleepy in a Day	192				
Never	976	12.8	13	0.9	x^2: 1.827 p: 0.609 df: 3
Sometimes	173	65.2	54	3.6	
Often	80	11.5	6	0.4	
Usually		5.3	4	0.3	
Sleep Problems Frequency					
Never	26	3.6	4	0.5	x^2: 5.336 p : 0.255 df: 4
Sometimes	453	62.4	24	3.3	
Often	148	20.4	5	0.7	
Usually	63	8.7	3	0.4	
Sleep Quality					
Very Bad	46	3.1	2	0.1	x^2: 1.696 p: 0.638 df: 3
Bad	155	10.3	5	0.3	
Good	768	51.3	45	3.0	
Very Good	452	30.2	25	1.7	

Sleep Problems and Internet Use in Association with Adolescents

Adolescents' internet use was found to be associated with fall asleep duration and the relationship was significant ($p<0.005$) while the relationship was not found to be associated with insomnia, sleepiness and feeling tired during a day ($p>0.005$). Additionally, adolescents' internet uses no differenced-on sleep problems frequency, awakening in the morning restfully, feeling asleep while studying or class in their schools and sleep quality ($p>0.005$) (Table 5).

Discussion

We investigated whether the associations between adolescents' sleep habits and internet use and changing sleep patterns in this study. Our analyses revealed that four significant findings. Firstly, sleep habits of the adolescents were at the ideal level. In the study, 54.3% of adolescents stated that their sleep quality as "good" and 31.8% of them stated as "very good". Factors such as fall asleep duration, sleep duration, having frequent insomnia and feeling tired during a day affected adolescents' sleep quality (18). Adolescents' sleep quality was not considered as bad due to the evaluations that they fell asleep within 5-10 min (36.4%) and 15-20 min (34.8%) and they slept more than 9 hours during weekdays and weekends. Our study results are convenient with the generally accepted sleep hours for adolescents and that adolescents should complete the necessary amount of sleep hours. Additionally, the rate of those who felt tired and sleepy during a day was low since they had a normal level of sleep during the night as also Gomes Felden et al. (2016) stated (22). Different results were obtained in fall asleep durations in other studies which were conducted for the purposes of determining adolescents' sleep habits (23, 24). Adolescents were prone to sleep less than 9 hours during week days and to go to bed and to wake up later hours at weekends in the analysis of their sleep hours for weekdays and weekends (17, 19). The differences between studies were attributed to various criteria including socio-cultural characteristics such as adolescents' age, stress levels, physical diseases and physical environments in their sleeping rooms, (25, 26); different definitions of sleep quality and different criteria related to sleep quality.

The second important finding in the present study was that internet use of adolescents was not pathological although almost all of them used internet. Internet use has become indispensable due to interactions in academic, family, friends and social platforms (27). Adolescents were expected to use internet long hours for multi-dimensional without having any intentions (28). Our study results support this condition (94.9%). Similar to other studies, adolescents generally used internet at home and preferred using mobile phone to access the internet (29). The finding, that internet use was not pathological for adolescents although the rate was high, might be attributed to the duration of internet use (using internet more than 2 hours, 23.1%) and the frequency of internet access (the rate of adolescents who used the internet every day, 43.7%). These values were lower than the findings of pathologic internet use which could be obtained from other studies (30). This result might also be attributed to that majority of families put limitations on internet use (85.4%) and adolescent individuals obeyed such rules (78.7%).

The third finding of the present study was that significant differences were obtained between adolescents' economic conditions, father educational background, family type, school success and internet use, sleep problems ($p<0.05$) as supporting the literature (31). The possibility of that high educational background offers high level of salary and sharing the income to fewer members in nuclear family type made economic conditions better compared to other families. Therefore, adolescents might have their own rooms, have one or more devices to access the internet and spend more hours in internet (30). In our study, the rate of sleep problems and internet use of adolescents, who were a member of elementary family type and have better levels of economic conditions, is higher. In some studies parents' educational background and economic conditions were found not to create a problem for adolescents' access the internet and parents could find different solutions for their children (27, 28). On the other hand, in our study, the rate of internet use (31.5%) and sleep problems (15.0%) was found to be higher in adolescents whose father's educational background was high school graduate, as like international literature. The difference of the present study and other studies might be attributed to that other studies were generally conducted with older adolescents or regional cultural differences. In our study, the internet using adolescents' school success was found to be good (63.5%) while many studies concluded that long time of the internet use lowered adolescents' school success (32-35). Kim et al. found that there was a positive relationship between the use of the internet and school achievement in their work and that this was related to the use of internet for research for 2 hours per day (31, 36). This finding suggested that adolescents with school success used the internet for studying lessons. As similar to Jackson et al. (2011) study, the internet use was considered to develop students' reading skills (37). Spending a reasonable amount of time on the internet for the purpose of studying affected adolescents' school success and sleep habits in positive manners while extending the hours brings sleep problems. This might be considered as the reason of why students with high level of success in their lessons had sleep problems (65.7%).

The fourth important finding of the study was that internet use affects adolescents' sleep habits, delay of the timing of sleep, sleep problems and fall asleep durations. Nowadays in many societies, adolescents are known to use the internet when they indeed are expected to sleep (38-40), and they delay their sleep hours as accessing the internet with devices including tablet, smartphones and computer which lead suppression of melatonin release (14, 41, 42). In the studies, which were conducted for the purpose of analysing the relationship between adolescents' internet use and sleep habits, the frequency of sleep problems in adolescents who spent longer time in internet increased (15, 35), felt lack of sleep (43, 44) and slept fewer hours in nights (13, 19, 38, 45) as similar to our study result. Internet use also affected adolescents to fall asleep durations (15, 45). 16.1% of adolescents who used the internet were found to fall asleep in more than 30 min. while only 0.8% of adolescents who no use the internet fall asleep in more than 30 min. Adolescents who enjoy internet might want to extend the duration of internet use which impacts their sleep quality (46). Adolescents used internet not only for the purpose of studying but for entertainment purposes. As a result, proper internet use does not bring changes in adolescents' sleep habits. Extension and out of purposes internet use impacts adolescents' sleep patterns which lead to sleep problems and sleep quality reductions.

Conclusion

There were some limitations in our studies. Internet use and sleep habits were obtained by a self-report adolescent, which might limit the accuracy of the data. Second, the study was conducted in only 5 secondary schools with the contribution of 5th, 6th and 7th-grade students of these schools. This is not enough to generalize the results to all secondary schools. So, it would be more beneficial to include the 8th Grade of the next studies. Thirdly, some details of factors that may influence the outcome may not be completely documented. Sleep problems were only compared with factors related to internet use in our study. Generally, our study reveals that family economic conditions, educational background and family type have effects on adolescents' sleep habits and internet use. Additionally, adolescents' school success is affected by both internet use and sleep habits. But there may be other causes of sleep problems not examined here. Finally, this was a single-institution study. Due to these restrictions, associations should be interpreted with caution. Further randomized, prospective, controlled trials on larger series are necessary for making more precise interpretations.

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