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The Examination of Technological Device Usage and Sleep Habits among the Children Before and During the COVID-19 Pandemic

COVID-19 Pandemi Öncesi ve Sürecinde Çocukların Teknolojik Cihaz Kullanımı ve Uyku Alışkanlıklarının İncelenmesi

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Abstract

Objective: This study was conducted to examine the technological device usage states and sleep habits of 5-12 year-old children before and during the Coronavirus disease-2019 (COVID-19) pandemic.

Materials and Methods: It is a descriptive study. This study was conducted with the parents of 488 children who were aged between 5-12 years old and studying in a kindergarten, 3 elementary schools and 3 secondary schools between March 2021 and June 2021. Data were collected by "Descriptive Information Form" and the "Children's Sleep Habits Questionnaire (CSHQ)" in the study. Descriptive statistics and parametric tests were used to analyze the data.

Results: In the study, a statistically significant difference was found in technological device usage and times of children before and during the COVID-19 pandemic period ($p<0.05$). It was determined that 100% of children had sleep problems clinically. A statistically significant difference was found between the mean scores of students from the CSHQ based on the education and income states of their parents ($p<0.05$). Additionally, a statistically significant difference was found between the mean CSHQ scores based on the duration of child's daily technological device usage ($p<0.05$).

Conclusion: Longer time spent with technological devices by 5-12 year old children during the COVID-19 pandemic was found to show a negative effect on the sleep habits of the children.

Keywords: Sleep, technological device, child, COVID-19, pandemic

Öz

Amaç: Bu araştırma Koronavirüs hastalığı-2019 (COVID-19) pandemi öncesi ve sürecinde 5-12 yaş çocukların teknolojik cihaz kullanım durumları ve uyku alışkanlıklarını incelemek amacıyla yapılmıştır.

Gereç ve Yöntem: Araştırma tanımlayıcı bir çalışmadır. Araştırma Mart 2021-Haziran 2021 tarihleri arasında bir ile bağlı bir anaokulu, 3 ilkokul ve 3 ortaokulda eğitim gören 5-12 yaş 488 çocuğun ebeveynleri ile gerçekleştirilmiştir. Araştırmanın verileri "Ebeveyn ve Çocuk Bilgi Formu", "Teknolojik Cihaz Kullanım Durumu Anketi" ve "Çocuk Uyku Alışkanlıkları Anketi (ÇUAA)" ile toplanmıştır. Verilerin analizinde, tanımlayıcı istatistik testler ve parametrik testler kullanılmıştır.

Bulgular: Araştırmada çocukların kullandıkları cihaz ve sürelerinin COVID-19 pandemi süreci öncesi ve sürecinde arasında anlamlı ilişki olduğu tespit edilmiştir ($p<0,05$). Çocukların %100'nün klinik olarak uyku sorunu olduğu belirlenmiştir. Ebeveynlerin eğitim durumu ve gelir durumu ile ÇUAA puan ortalamaları arasında anlamlı bir fark saptanmıştır ($p<0,05$). Ayrıca çocuğun günlük teknolojik cihaz kullanım süresi ile ÇUAA puan ortalamaları arasında istatiksel olarak anlamlı fark olduğu tespit edilmiştir ($p<0,05$).

Sonuç: COVID-19 pandemi sürecinde 5-12 yaş arası çocukların teknolojik cihazlarla fazla zaman geçirmesi çocukların uyku alışkanlıklarına olumsuz etki gösterdiği bulunmuştur.

Anahtar Kelimeler: Uyku, teknolojik cihaz, çocuk, COVID-19, pandemi

Introduction

The increased use of the internet and technological devices such as computers, tablets, cell phones, television and others has become common all over the world, and especially children are the biggest consumer group of these devices (1,2). In the statement of the American Academy of Child and Adolescent Psychiatry, it was reported that the time spent in front of the screen was 4-6 hours in 8-12-year-old children and up to 9 hours among adolescents in the USA (3). Turkish Statistical Institute data reported that the internet usage rate was 50.8% in 2013 whereas it was 82.7% in 2021 among 6-15 years old children and the ratio of children, who mentioned using social media regularly, was 94.2% (4). Overuse of technological devices has been found to cause social and cognitive health problems

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such as social isolation, low self-esteem, shyness, depression, anxiety, attention deficit, aggressiveness and addiction (5-7). Moreover, improper or unhealthy use of technological devices by children might lead to problems such as pain/stiffness in the neck, shoulder, waist, hands and wrists, vision problems, tinnitus, fatigue, sleeplessness and weight gain/obesity (8-12). Sleep is an important requirement for the health and development of a child during the childhood period (13,14). It has significant effects on the cognitive, psychosocial and physical health of children including learning, memory and adaptation, character and academic success, physical growth, metabolism and body mass index (13). Insufficient sleep in children has been reported to increase the risk of accidents, injury, hypertension, obesity, diabetes and depression as well as it might lead to attention, behavioural and learning problems (15-17). In previous studies, it was reported that technological device usage among children resulted in sleep disorders and a change in sleep habits (1,10,11,18). In a study which was carried out in Spain, it was found that screen time longer than 120 minutes per day caused a shorter sleep time in one out of every four children (19). In their study, Fuller et al. (1) found that the children, who were watching television before sleeping, slept nearly 30 minutes less per night and their sleep quality was decreased. Also, a study from Turkey showed that the increase in screen time was correlated with a decrease in sleep time (18). The literature review has revealed that there is a limited number of studies on the relationship between technological device usage and sleep habits, and also technological device usage and sleep habits of children have not been investigated during the Coronavirus disease-2019 (COVID-19) pandemic. Pediatric nurses have the responsibility to ensure quality and sufficient sleep, which is very crucial for the healthy growth and development of children. Therefore, identification of the problems regarding technological device usage and sleep habits of children would provide convenience to pediatric nurses. In this study, it was planned to examine these two factors. This study was carried out to examine the technological device usage and sleep habits of children.

Research Questions

- How common was the usage of technological devices among 5-12-year-old children before the COVID-19 pandemic?
- Have the sleep habits of 5-12-year-old children changed during the COVID-19 pandemic?
- Does the technological device usage status of 5-12-year-old children affect their sleep habits?

Materials and Methods

Study Type

This was a descriptive type of study.

The Population and Sample of the Study

The population of the study included the parents of a total of 1766 5-12-year-old children who were registered to a total of 7 schools in a district in the Black Sea Region (a kindergarten, 3 primary schools and 3 secondary schools) between March and June 2021. The sample was calculated as 316 students with the sample size formula for a known population at a confidence interval of 95% and a total of 488 children and parents, who were literate and had internet access, were reached in the study (20).

Data Collection Instruments

The Descriptive Information Form, which was created by the researchers, and the Children's Sleep Habit Questionnaire were used to collect data in the study.

Descriptive Information Form: There were a total of 12 questions in this form which was created by the researchers in line with the literature to determine sociodemographic variables (age, sex, education level of the parents, and income status of the family) and their features regarding technological devices they had, outside of education activities/purposes of internet usage and the change in their sleep habits. Parents were asked to answer these questions about the usage of technological devices outside of the education activities/purposes in two categories as before and during the COVID-19 pandemic (13,18,21).

The Children's Sleep Habits Questionnaire (CSHQ): This questionnaire was developed by Owens et al. (22) in 2000 to investigate the problems related to sleep habits and problems of children. It consists of 33 items and the internal consistency coefficient (Cronbach alpha) was 0.68 for the control group and 0.78 for the intervention group. The validity and reliability study of its Turkish version was conducted by Fiş et al. (23) in 2010 and the internal consistency coefficient was found as 0.78. In this study, the Cronbach alpha coefficient of CSHQ was found as 0.69. There are eight subscales in this questionnaire screening sleeping disorders observed in children according to the international classification of sleep including bedtime resistance, sleep onset delay, sleep duration, sleep anxiety, night wakings, parasomnias, sleep-disordered breathing and daytime sleepiness. Parents are asked to score their children's sleep habits retrospectively according to the previous week. The total test score is obtained by the sum of scores obtained from all items. Based on the frequency of habits per week, 3 is given to generally (between 5-7 times/week), 2 is given to sometimes (between 2-4 times/week) and 1 is given to rarely (between 0-1 time/week). Questions 1, 2, 3, 10, 11 and 26 are reverse-scored. Moreover, questions 32 and 33 are coded as 0,1 and 2 based on their frequency. The cut-off score of the scale is 41 and total scores more than the cut-off score are considered "clinically significant". As the total score increases, the sleep of children is affected negatively.

Data Collection

Since online education was continuing because of the COVID-19 pandemic when the study was conducted, school administrators and teachers were informed about the purpose of the study, and the necessary institutional permissions were obtained. Then, the Google forms created by the researchers were sent to the parents and data were retrieved. It took about 10-15 minutes for the parents to fill out the questionnaire.

Statistical Analysis

Data were analyzed online with SPSS 22 (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk,

NY: IBM Corp.) program. The normality assumption of continuous data was analyzed with the Kolmogorov-Smirnov test. Student's t-test was used to compare homogenous data between two different groups. One-Way analysis of variance (ANOVA) test was used to make a comparison of homogenous data between three and more groups. Categorical variables in all groups were compared with the chi-square test. Analysis results of continuous variables were given as arithmetic mean, standard deviation, and median (minimum-maximum) whereas categorical data were shown in frequencies. The statistical significance level was taken as $p<0.05$.

Ethical Aspect of the Study

Ethics approval of the study was taken from Ondokuz Mayıs University Social and Human Sciences Ethics Committee (decision no:2020/767, date: 11.27.2020). Necessary permissions were obtained from the relevant institutions to conduct the study at schools during the full-time quarantine period (29 April 2021-17 May 2021) (date: 03.02.2021; no: E-25072426-605.01-21479809). Permission was also obtained from Fiş et al. (23) to be able to use the questionnaire in the study. All stages of the study complied with the principles of the Helsinki Declaration. The consent of each parent included in the study was taken via an online questionnaire.

Results

While 51.4% of the children were between 9 and 12 years of age, the mean age was 8.41 years. About half of them (52.9%) were female students and 62.3% of the parents were between 31-40 years of age. Half of the parents (50.4%) had an undergraduate education and 43.9% had an income which was equal to their expenses (Table 1). Based on the statements of parents, 49.6% of the children were found to use tablets/computers and 57.6% were found to use cell phones before COVID-19. During the pandemic, a total of 67.0% of children stated that they used tablets/computers and 69.9% used cell phones outside of education activities/purposes. While the technological device usage rate of more than four hours per day was 16.2% before the pandemic, it was found to be 51.4% during the COVID-19 period. Moreover, tablet/computer and cell phone usage states and daily usage times of children were found to be significantly different before and during the COVID-19 period ($p<0.05$) (Table 2). Descriptive statistical data related to CSHQ were given in Table 3. The mean total CSHQ score was found as 77.53±6.52. Mean scores obtained from the subscales were found as 11.13±2.34 for Bedtime resistance, 1.85±0.93 for sleep onset delay, 5.02±0.73 for sleep duration,

Table 1. Socio-demographic characteristic of the children and parents (n=488)

Variables		n	%
Child's age	5-8 years old	237	48.6
	9-12 years old	251	51.4
Child's sex	Male	230	47.1
	Female	258	52.9
Parent's age	30 years and younger	56	11.5
	31-40 years old	304	62.3
	41 years and older	128	26.2
Parent's education level	Elementary school	58	12.0
	Secondary school	69	14.1
	High school	71	14.5
	Undergraduate and higher	290	59.4
Parent's income level	Income less than expenses	128	26.2
	Income equal to the expenses	214	43.9
	Income more than expenses	146	29.9

Table 2. The distribution of technological device usage characteristics outside of the education purposes of the children before and during the pandemic based on parents' statements

Variables		Before COVID-19		During COVID-19		Test statistic p
		n	%	n	%	
Child's tablet/ computer usage status	Yes	242	49.59	327	67.01	175.719 **0.000**
	No	246	50.41	161	32,99	
Child's cell phone usage status	Yes	281	57.60	341	69.90	187.817 **0.000**
	No	207	42.40	147	30.10	
Child's daily technological device usage time	0-2 hours	317	65.00	154	31.60	163.897 **0.000**
	3-4 hours	92	18.90	83	17.00	
	More than 4 hours	79	16.20	251	51.40	

COVID-19: Coronavirus disease-2019

Table 3. Descriptive statistics related to CSHQ

	Mean ± SD	Median	(Min-max)
Total CSHQ score	77.53±6.52	78	52-91
Bedtime resistance	11.13±2.34	11	5-15
Sleep onset delay	1.85±0.93	1	1-3
Sleep duration	5.02±0.73	5	3-8
Sleep anxiety	9.35±2.38	10	4-12
Night wakings	7.98±1.31	8	3-9
Parasomnias	19.52±1.72	20	12-21
Sleep disordered breathing	8.70±0.77	9	3-9
Daytime sleepiness	16.09±2.61	16	8-22
		n	%
CSHQ	No sleep problems	-	-
	Have sleep problems	488	100
Status of change in the sleep habits of children during COVID-19 period based on the parent's statement	Yes	200	41.0
	No	288	59.0

CSHQ: Children's Sleep Habits Questionnaire, COVID-19: Coronavirus disease-2019, SD: Standard deviation, Min: Minimum, Max: Maximum

9.35±2.38 for sleep anxiety, 7.98±1.31 for night wakings, 19.52±1.72 for parasomnias, 8.70±0.77 for sleep-disordered breathing and 16.09±2.61 for daytime sleepiness. When those with a score above 41 on the CSHQ were evaluated as "clinically significant", all children (100%) were found to experience sleep problems. A total of 41% of the parents stated that the sleep habits of their children changed during the COVID-19 pandemic (Table 3). The mean CSHQ scores of the children were found to differ significantly based on the child's age ($p<0.05$). The mean scores of the parents were also found to be significantly different based on the education and income levels and the mean CSHQ scores of the parents, who stated to have a high school degree and had an income equal to expenses, were found to be significantly higher ($p<0.05$). Moreover, the mean scores of the children were found to be significantly different based on their daily technological device usage times and those who spent more than 4 hours with technological devices were found to have higher scores than the others ($p<0.05$) (Table 4).

Discussion

In this study, tablet/computer and cellphone usage and daily usage times of the children were found to increase during the COVID-19 pandemic compared to the pre-COVID period. The study by Koran et al. (24), which was carried out with 3-6-year-old children, reported that the number of those, who used mobile phones for more than one hour, was significantly increased. In their study, Zengin et al. (25) stated that time spent on television, tablet or telephone was 3-4 hours in 36.6% and more than 4 hours in 32.0% during the pandemic. Moreover, screen times were found to increase among 71.7% of children aged between 6-13 years old during the COVID-19 pandemic in the study by Ozturk Eyimaya and Yalçin Irmak (26). Dong et al. (27) indicated that the technological device usage rate of children and adolescents all day was 27% before the pandemic whereas this rate has increased by half during the pandemic. It has been suggested that the pandemic resulted in a higher rate of technological device usage among children. Having a total mean score higher than 41 on the CSHQ in the study has shown that children experienced sleep problems at a clinically significant level (23). In this study, the total mean CSHQ score was found as 77.53±6.52, and all children were determined to have sleep problems. In the study by Tatsiopoulou et al. (28), which was conducted with the parents of preschool children during the COVID-19, 81.5% of the children were found to have sleep problems. Similarly, the study by Öztürk et al. (21) including the parents of 6-11-year-old children reported that 76.6% experienced sleep problems. The results of this study have shown similarities with other studies in the literature. In this study, the sleep habits of 9-12-year-old children were found to be affected more negatively compared to 5-11-year-old ones. Also in the study by Kotrla Topić et al. (29) which was carried out with the parents of 3-14-year-old children during the COVID-19 pandemic, it was detected that the sleep quality of children decreased as their age increased. It has been suggested that own technological device usage would likely be increased among children depending on the child's autonomy and school needs as they get older and their sleep problems may occur as a result. Mean CSHQ scores of the children whose parents had an education level of high school were found to be higher than those with an undergraduate and postgraduate degree. In the study by Yland et al. (30) where they focused on screen time and sleep duration among school-age children, children whose

Table 4. Distribution of mean CSHQ scores based on the sociodemographic characteristics of the children and parents

Variables		Mean ± SD	Median (min-max)	Test statistic
Child's age	5-8 years old	76.52±6.32	77 (52-89)	-3.348 **0.001**
	9-12 years old	78.48±6.58	79 (57-91)	
Child's sex	Male	77.11±6.59	78 (52-91)	1.517 0.130
	Female	78.00±6.42	78 (60-91)	
Parent's age	30 years and younger	77.17±6.00	77 (52-91)	0.382 0.682
	31-40 years old	77.42±6.16	78.5 (53-90)	
	41 years and older	77.94±7.53	78 (57-91)	
Parent's education level	Elementary school	77.41±6.78	78 (52-89)	3.15 **0.025**
	Secondary school	77.30±6.93	77 (57-89)	
	High school	79.70±5.96	80 (64-91)	
	Undergraduate and higher	77,08±6,42	78 (53-90)	
Parent's income level	Income less than expenses	73.95±7.14	76 (51-88)	59.705 **0.000**
	Income equal to the expenses	80.69±5.07	81.00 (62-90)	
	Income more than expenses	76.04±5.6	76.50 (53-89)	
Daily technological device usage time outside of the purpose of education during COVID-19 period	0-2 hours	76.59±6.60	77 (52-91)	5.37 **0.005**
	3-4 hours	76.45±6.47	78 (57-89)	
	More than 4 hours	78.46±638	79 (57-91)	

CSHQ: Children's Sleep Habits Questionnaire, COVID-19: Coronavirus disease-2019, SD: Standard deviation, Min: Minimum, Max: Maximum

mothers had a high education level were found to sleep more. However, the results of the study by Öztürk et al. (21) showed that the education level of the parents did not affect the sleep patterns of the child. The sleep habits of the children, whose parents had an income equal to their expenses, were found to be affected negatively. In the study by Aguilar-Farias et al. (31) conducted with 1-5-year-old children, children with parents who had a higher income were found to have better sleep quality. Furthermore, Bapat et al. (32) reported in their study including 10-15-year-old children that children with a high socioeconomic level slept about one and a half hours less than those with a low socioeconomic level. Dube et al. (33), similarly, noted that parents with undergraduate education and a high-income level had children with better sleep quality. In the study, technological device usage outside of the purpose of education time for 4 hours and longer per day was found to affect the sleep habits of the children during the COVID-19 pandemic. Ham et al. (34) found that children with a daily screen time for 3 hours or more had a shorter sleep duration. Beyens and Nathanson (10) indicated that more frequent television and tablet usage among children in general as well as in the evenings was found to be associated with sleeping late and waking up late. In the study by Guerrero et al. (35) including 9-10-year-old children, sleep duration was determined to get shorter as screen time increased. Besides, Twenge et al. (11) reported that children/adolescents, who spent more time in front of the screen, slept less and had insufficient sleep. Also, Almuaigel et al. (36) found a positive correlation between poor sleep score and technological device usage for 3-5 hours in their study including 3-5-year-old children. The results of this current study had similarities with the relevant data in the literature.

Study Limitations

The inability to get access to the parents who were not using phones and the internet since the study data was collected through online forms was the main limitation of the study. Furthermore, determining the use of technological devices other than sleep characteristics and educational activities/purposes of children and the fact that data obtained from the parents were based on self-reports of the parents are among the limitations of the study.

Conclusion

In this current study, tablet/computer and cell phone usage and daily usage times were found to increase during the pandemic compared to the pre-COVID period. Mean CSHQ scores of the children were found to be higher during the COVID-19 pandemic, and all children were found to experience sleep problems. It was also determined that the child's age, parent's education level and income status and daily technological device usage time of the children during the COVID-19 pandemic affected the children's sleep habits. Also, the sleep habits of the children, whose parents reported no change in the sleep habits of their child during the pandemic, were found to be affected negatively. Based on the results of this study, it may be suggested that nurses working in the field of public and pediatric health can provide counselling for healthy sleep habits and healthy technological device usage. Pediatric nurses working in the clinics may provide training to the parents about the importance of sleep, sleep hygiene and technological device usage. They should consult the children and families in order to reduce technological device usage by recognizing physical problems that might occur in children due to overuse of technological devices such as vision problems, headaches and sleep problems, especially during the pandemic.

In addition, school nurses may provide training for the children, families and teachers about the importance of sleep, improvement of sleep habits and healthy usage of technological devices.

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Ethics

Ethics Committee Approval: Ethics approval of the study was taken from Ondokuz Mayıs University Social and Human Sciences Ethics Committee (decision no:2020/767, date: 11.27.2020).

Informed Consent: The consent of each parent included in the study was taken via an online questionnaire.

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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., Literature Search: Z.Ö.S., E.T.B., Writing: Z.Ö.S., E.T.B.

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