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The Effect of Digital Screen Exposure and Temperament on Sleep Problems in Children During the COVID-19 Pandemic: Rural Area in Turkey

COVID-19 Pandemisi Sırasında Dijital Ekrana Maruz Kalma ve Mizacın Çocukların Uyku Sorunlarına Etkisi: Türkiye Kırsal Bölge

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Abstract

Objective: More and more children experience sleep problems, which are believed to be exacerbated by the Coronavirus disease-2019 (COVID-19) pandemic and digital screen exposure. This descriptive and cross-sectional study investigated the relationship between sleep problems and digital screen exposure and temperament in children during the COVID-19 pandemic.

Materials and Methods: The sample consisted of 122 parents of children aged 3-6 years. Data were collected using a descriptive characteristics questionnaire, the children's sleep habits questionnaire, and the short temperament scale for children.

Results: Most children have been watching more TV (77.9%) and spending more time on computers/tablets/smartphones (89.3%) since the COVID-19 pandemic. There was a relationship between screen time and sleep duration (<0.05), sleep anxiety (<0.05), daytime sleepiness (<0.05), and total sleep score (<0.05).

Conclusion: There is also a relationship between sleep problems and digital screen exposure and temperament during the COVID-19 pandemic. Policymakers and educators should take measures to promote children's health and education during the COVID-19 pandemic.

Keywords: COVID-19, digital screen exposure, preschooler, sleep problems

Öz

Amaç: Gün geçtikçe daha fazla sayıda çocuk, Koronavirüs hastalığı-2019 (COVID-19) pandemisi ve dijital ekran maruziyeti ile arttığına inanılan uyku sorunları yaşamaktadır. Bu tanımlayıcı ve kesitsel çalışmada, COVID-19 pandemisi sırasında çocuklarda uyku sorunları ile dijital ekrana maruz kalma ve mizaç arasındaki ilişkiyi araştırmayı amaçladık.

Gereç ve Yöntem: Üç-altı yaş arası çocuğu olan 122 ebeveyn çalışmaya dahil edildi. Veriler, tanımlayıcı özellikler anketi, çocukların uyku alışkanlıkları anketi ve çocuklar için kısa mizaç ölçeği kullanılarak toplandı.

Bulgular: Çocukların çoğu, COVID-19 pandemisinden bu yana daha fazla TV (%77,9) izlemekte ve bilgisayar/tablet/akıllı telefonlarda (%89,3) daha fazla zaman geçirmektedir. Çalışmamızda, ekran süresi ile uyku süresi (<0,05), uyku kaygısı (<0,05), gündüz uykululuğu (<0,05) ve toplam uyku puanı (<0,05) arasında ilişki saptanmıştır.

Sonuç: COVID-19 pandemisi sırasında uyku sorunları ile dijital ekrana maruz kalma ve mizaç arasında da bir ilişki vardır. Yöneticiler ve eğitimciler, COVID-19 salgını sırasında çocukların sağlığını ve eğitimini teşvik etmek için önlemler almalıdır.

Anahtar Kelimeler: COVID-19, dijital ekrana maruz kalma, okul öncesi, uyku sorunları

Introduction

The novel coronavirus responsible for the Coronavirus disease-2019 (COVID-19) pandemic is a highly contagious virus with high mortality rates (1). Turkey announced its first confirmed case of COVID-19 on March 11, 2020 (2). Most countries, including Turkey, have closed schools as part of their measures to limit contact between people and to slow down the spread of the virus. Turkey has also closed down all public and private preschools and shifted to distance learning within the scope of "Measures to be taken in emergencies" per the Ministry of National Education Regulation on pre-school education and primary education institutions (3). There were 32.554 preschools and 1,629.720 students in the 2019-2020 academic year in Turkey. There are 6,461.039 million children at preschool age (3 to 6) in Turkey. One out of every four children aged 3-6 years receives preschool education. There are 172.282 children aged 36-48 months and 439.586

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children aged 48-60 months who receive early childhood care and education (3).

The COVID-19 pandemic has had a tremendous impact on all aspects of life. Countries have taken numerous measures (social distancing, school closures, lockdowns, etc.) to minimize social contact and to slow down the spread of the virus. All students got stuck at home due to school closures and had to go through distance learning. In addition, children of a certain age were not allowed to go out at certain times of the day. Although preventive measures are necessary for public health, they may take a toll on children because long-term school closures and lockdowns may have adverse mental and physical health outcomes (4,5). Children are physically less active, have more screen time, sleepless regularly, eat less healthily when they do not go to school (weekends, summer vacations, etc.). This lifestyle has numerous adverse health effects, such as weight gain and cardiovascular problems (4,6). In addition, children have ended up spending much more time on smart devices since the onset of the pandemic because they have not been able to gone out and socialize with their friends. Children who spend too much time online are more likely to develop physiological and psychological health problems in adolescence (7-9). The World Health Organization recommends that children under age 5 spend one hour or less on digital devices and that those under age 1 spend no time at all (10). Too much screen time may cause delayed language acquisition, obesity, sleep problems, and reduced physical activity (11,12). Sleep problems affect children physiologically and neuropsychological. Insufficient sleep and sleep disorders are common among children (13). Such sleep disorders may be of biological, psychosocial, or environmental origin (14). Recent research has shown that too much screen time causes sleep problems (15,16).

Temperament in children is an interesting topic that arouses the curiosity of many researchers. However, there is very little research on temperament and its effect on sleep problems among children in Turkey. For example, Kahraman and Ceylan (17) reported that children who had access to smart phones and tablets and were allowed to spend more than two hours watching TV had more sleep problems and were more short-tempered.

There is no research into the effect of temperament and screen time on sleep problems among children in Turkey during the COVID-19 pandemic. We think that the repercussions of the pandemic have been immense, affecting children of all ages. Moreover, digital screen exposure has been a serious problem, especially in recent years. Therefore, this study investigated the effect of their children's digital screen exposure and temperaments on sleep problems through the eyes of parents during the COVID-19 pandemic.

Research Question

1. How do parents think their children's temperament and digital screen exposures affect their sleep patterns during the COVID-19 pandemic?

Materials and Methods

Study population

This descriptive and cross-sectional study was conducted in the spring semester of the 2020-2021 academic year. The study population consisted of all parents of 717 preschoolers (aged 36-72 months) of six schools in the district of a province in the Central Anatolian region of Turkey. Data were collected online (Google forms) between 30 April and 30 May 2021. No sampling was performed. Permission was obtained from the schools. Afterward, all parents who met the inclusion criteria were recruited. The sample consisted of 122 parents. The inclusion criteria were (1) being a parent of a preschooler 36-72 months of age, (2) agreeing to participate, (3) having an Internet connection, and (4) having given informed consent. Parents who declined to participate or failed to meet the inclusion criteria were excluded from the study. Principals and teachers were contacted, and a link to the survey was sent to online groups. The first page of the survey informed parents about the research purpose and procedure. Informed consent was obtained from those who agreed to participate. Participants filled out the survey and submitted it.

Data collection tools

The survey consisted of four parts. The first part was the 11-item descriptive characteristics questionnaire. The second part consisted of four items on digital screen exposure. The third was the children's sleep habits questionnaire (CSHQ). The fourth part was the short temperament scale for children (STSC).

The CSHQ- Short Form was developed by Owens et al. (18) and adapted to Turkish by Perdahlı Fiş et al. (19). The CSHQ is a retrospective, parent questionnaire that has been used in to examine sleep behavior in children. The scale determines children's sleep habits and sleep problems. The instrument asks parents to evaluate their children's sleeping habits in the previous week. The instrument consists of eight subscales (bedtime resistance, sleep onset delay, sleep duration, sleep anxiety, night wakings, parasomnias, sleep-disordered breathing, and daytime sleepiness) and 33 items rated on a three-point scale as [1="usually" (i.e., 5-7 times within the past week); 2="sometimes" (i.e., 2-4 times within the past week), and 3="rarely" (i.e., never or 1 time within the past week)]. Items 1, 2, 3, 10, 11, and 26 are reverse scored. Items 32 and 33 are coded on a scale of 0 to 2 (0=does not seem sleepy; 1=seems very sleepy; and 2=falls asleep). A total score of 41 is considered the cut-off point, above which indicates "clinical significance" (19). The Turkish version of the scale has a Cronbach's alpha of 0.78 (19), which was 0.75 in the present study. CSHQ appears to be a useful sleep screening tool for describing sleep habits and identifying problem sleep areas in school-aged children.

The STSC was developed by Prior, Sanson, and Oberklaid (1989) and adapted to Turkish by Yağmurlu and Sanson (20). The instrument measures four temperament dimensions: Approach (sociability) (e.g. ''My child is shy when first when

first meeting new children''), persistence (e.g. ''My child likes to complete one task or activity before going on to the next''), rhythmicity (e.g. ''My child asks for or takes a snack about the same time each day''), and reactivity (e.g. ''When upset or annoyed with a task, my child throws it down, cries slams doors, etc.''). Parents fill out the scale. The instrument consists of 30 items scored on a six-point Likert-type scale (1=rarely to 6=almost always). The mean score is the sum of all item scores divided by the number of marked items. A high score on each dimension, respectively, shows reactive, persistent, withdrawing, and arrhythmic temperamental traits (20). The scale had a Cronbach's alpha of 0.72 in the present study.

Statistical Analysis

The data were analyzed using the Statistical Package for Social Sciences (SPSS 22.0, IMB) at a significance level of 0.05 and 0.001. Normality was tested using the Kolmogorov-Smirnov and Shapiro-Wilk tests. The data regarding the CSHQ total and subscale scores were non-normally distributed, while the data regarding the STSC subscales were normally distributed. Number and percentage were used for descriptive statistics. The non-normally distributed data were analyzed using the Mann-Whitney U and Kruskal-Wallis tests, while the normally distributed data were analyzed using the Independent Groups t-test and One-Way ANOVA. A regression model was constructed to determine the effect of gender and TV viewing duration on sleep problems. Statistical significance was tested using multiple regression analysis. The reference categories were male gender and watching TV for 0-30 minutes. The regression analysis had a constant value of 44.172 and an explanatory power of 13%.

Results

Mothers, fathers, and children had a mean age of 33.68±4.96, 36.40±5.1, and 4.81±0.9, respectively. More than half the children were girls (51.6%). Most data were collected from mothers (81.1%). More than a quarter of the mothers had a high school (39.3%) or a bachelor's degree (36.1%). More than a quarter of the fathers had a high school (39.3%) or a bachelor's degree (39.3%). Most participants had a nuclear family (82%), while less than a quarter had an extended family (16.4%). Most participants reported that their children had spent more time watching TV (77.9%) and using smart devices (89.3%) since the onset of the pandemic. Almost half the children had been watching TV for 4-6 hours (45.5%). More than a quarter of the children had been watching TV for 1-3 hours (28.7%). Sixteen percent of the children had been watching TV for 0-30 minutes. Children had been using smart devices for 4-6 hours (28.7%), 1-3 hours (23.8%), 31-60 minutes (21.3%), or 30 minutes (20.5%). Only seven children had been using smart devices for more than seven hours (not shown in Tables).

Table 1 shows the CSHQ and STSC scores. Children had a CSHQ score of 35 to 67 (median=49.5). Children with clinically significant sleep problems (n=105) had a CSHQ score of 42 to 67 (median=50). Children's STSC subscale scores were normally distributed. Their STSC "reactivity" subscale score ranged from 1 to 4.67 (arithmetic mean=2.95±0.58). They had arithmetic mean STSC "approach (sociability)," "persistence," and "rhythmicity" subscale score of 3.70±0.72, 3.39±0.62, and 3.89±0.58, respectively.

Table 2 shows the descriptive characteristics and CSHQ scores. Children aged three years had a median CSHQ "sleep anxiety" subscale score of 10. Children aged 3-4 years had a median CSHQ "daytime sleepiness" subscale score of 15. Children aged three years had a median CSHQ total score of 54.5. These results showed that age affected children's sleep anxiety, daytime sleepiness, and CSHQ total score ($p<0.05$). Children of mothers aged 23-27 years had a median CSHQ "bedtime resistance" subscale score of 9. Children of mothers over 34 years of age had a median CSHQ "bedtime resistance" subscale score of 12. These results showed a relationship between mothers' age and children's bedtime resistance ($p<0.05$). Children with longer screen time during the COVID-19 pandemic had a median CSHQ "sleep duration," "sleep anxiety," and "daytime sleepiness," subscale score of 4, 8, and 15, respectively. They had a median total CSHQ score of 50. There was a relationship between longer screen time and sleep duration ($p<0.05$), sleep anxiety ($p<0.05$), daytime sleepiness ($p<0.05$), and total CSHQ score ($p<0.05$). Children watching TV for more than 30 minutes a day had lower CSHQ "sleep duration," "parasomnias," and "daytime sleepiness" subscale and lower total CSHQ scores than those watching TV for less than 30 minutes. There was a relationship between TV viewing duration and sleep duration ($p<0.05$), parasomnias ($p<0.05$), daytime sleepiness ($p<0.05$), and total CSHQ score ($p<0.05$). Children using smart devices for 0-30 minutes a day had a median CSHQ "sleep duration" subscale score of 3. These results showed that screen time affected children's sleep duration and daytime sleepiness ($p<0.05$) (Table 2).

Table 1. CSHQ and STSC scores

CSHQ and subscales (n=122)	**Min-max**	**Median (Q_2)**	**Q_1-Q_3**
Bedtime resistance	6-18	11	9-12.23
Sleep onset delay	1-3	1	1-2
Sleep duration	3-6	4	3-5
Sleep anxiety	4-12	8	6-9
Night wakings	3-7	4	4-5
Parasomnias	7-14	8	7-9
Sleep disordered breathing	3-9	3	3-3
Daytime sleepiness	9-20	14	12-16
CSHQ total score	35-67	49.5	45-54
CSHQ total score **(n=105)** >41	42-67	50	47-55
STSC subscales (n=122)	**Min-max**	**$\overline{X}$**	**SD**
Approach (sociability)	2-6	3.70	0.72
Persistence	2.14-5.71	3.39	0.62
Rhythmicity	2.86-5.71	3.89	0.58
Reactivity	1-4.67	2.95	0.58

Q_1=25% percentage, Q_3=75% percentage, SD: Standard deviation, STSC: Short temperament scale for children, CSHQ: Children's sleep habits questionnaire

Table 2. Descriptive characteristics and CSHQ scores (n=122)									
Child's age	**Bedtime resistance Q_2 (Q_1-Q_3)**	**Sleep onset delay Q_2 (Q_1-Q_3)**	**Sleep duration Q_2 (Q_1-Q_3)**	**Sleep anxiety Q_2 (Q_1-Q_3)**	**Night wakings Q_2 (Q_1-Q_3)**	**Parasomnias Q_2 (Q_1-Q_3)**	**Sleep disordered breathing Q_2 (Q_1-Q_3)**	**Daytime sleepiness Q_2 (Q_1-Q_3)**	**Total Q_2 (Q_1-Q_3)**
3	12.5 (11.8-14.5)	1.5 (1-2)	3 (3-3.8)	10 (9.5-11)	5.5 (4.8-6.3)	9 (8.8-9.3)	-	15 (13.8-16.8)	54.5 (50.5-56.8)
4	11 (10-12)	2 (1-2)	4 (3-5)	8 (7-9)	4 (4-5)	8 (8-10)	3 (3-3.8)	15 (13-17)	50 (47-55.8)
5	10 (8-12)	1 (1-2)	4 (3-5)	7 (6-9)	4 (3-5)	8 (7.8-9)	3 (3-3)	14 (12-16)	48.5 (43.8-53)
6	11 (8.8-14)	1 (1-2)	3 (3-4)	8 (6-9.3)	4 (3-5)	8 (7-10)	3 (3-3.3)	12.5 (11-15.3)	46 (40.8-53.3)
	0.071*	0.184*	0.065*	**<0.05***	0.068*	0.419*	0.300*	**<0.05***	**<0.05***
Mother's age									
23-27	9 (7-12)	2 (1-2)	4 (3-5)	7 (5-9)	4 (4-5)	8 (8-9)	3 (3-3)	15 (13-16)	49 (44-54)
28-33	10 (9-11)	1 (1-2)	4 (3-5)	8 (6-9)	4 (3.5-5)	9 (7-10)	3 (3-3)	15 (12.5-17)	49 (45-55)
≥34	12 (9.8-13)	1 (1-2)	4 (3-4.3)	8 (7-9.3)	4 (4-5)	8 (7-9)	3 (3-3)	14 (12-16)	50 (45-54)
	<0.05*	0.379*	0.485*	0.113*	0.677*	0.617*	0.960*	0.475*	0.754*
Increase in TV viewing duration during the COVID-19 pandemic									
Yes	11 (9-12)	1 (1-2)	4 (3-5)	8 (6-9)	4 (4-5)	8 (7-10)	3 (3-3)	14 (12-16)	50 (46-55)
No	11 (9-13)	1 (1-2)	3 (3-4)	8 (6-9)	4 (3-5)	8 (8-9)	3 (3-3)	14 (12-16)	49 (45-53)
	0.978**	0.645**	0.112**	0.825**	0.351**	0.418**	0.198**	0.789**	0.406**
Increase in screen time (computers/tablets/smartphones) during the COVID-19 pandemic									
Yes	11 (9-12)	1 (1-2)	4 (3-5)	8 (6.5-9)	4 (4-5)	8 (7-10)	3 (3-3)	15 (12-16)	50 (46-54.5)
No	10 (7-13.5)	1 (1-2)	3 (3-3)	6 (6-8)	4 (3.5-5)	8 (7.5-8.5)	3 (3-3.5)	12 (11-14.5)	44 (38.5-48)
	0.452**	0.669**	**<0.05****	**<0.05****	0.911**	0.280**	0.773**	**<0.05****	**<0.05****
TV viewing duration per day during the COVID-19 pandemic									
0-30 minutes	11 (7.3-14)	1 (1-1.8)	3 (3-3)	7 (6-9.8)	4 (3.3-5.8)	8 (7-9)	3 (3-3)	12 (11-13)	44.5 (38-50.8)
31-60 minutes	11 (9-14)	1 (1-2)	4 (3-4)	9 (6-10)	4 (4-5)	9 (8-10)	3 (3-3)	15 (12-16)	51 (46-56)
1-3 hours	11 (9-12)	1 (1-2)	4 (3-5)	7 (6-9)	4 (3-5)	8 (7-9)	3 (3-3)	14 (13-16)	49 (45-52)
4-6 hours	11 (9-12)	1 (1-2)	4 (3-5)	8 (7-9)	4 (4-5)	9 (8-10)	3 (3-4)	15 (13-17)	50 (47-56)
	0.694*	0.311*	**<0.05***	0.197*	0.318*	**<0.05***	0.313*	**<0.001***	**<0.05***
Screen time (computers/tablets/smartphones) per day during the COVID-19 pandemic									
0-30 minutes	12 (7-14)	1 (1-2)	3 (3-4)	8 (6-10)	5 (4-6)	8 (7-9)	3 (3-3)	13 (11-14)	49 (38.5-53.5)
31-60 minutes	12 (9-13)	1 (1-2)	4 (3-5)	8 (6-9.3)	4 (3.8-5)	8 (7.8-9.3)	3 (3-3)	13 (11-15.3)	47 (44.5-53.5)
1-3 hours	10 (9-13)	1 (1-2)	4 (3-5)	8 (6.5-9)	4 (3-5)	8 (7-9)	3 (3-3)	15 (12-17)	49 (46-53.5)
4-6 hours	11 (9-12)	1 (1-2)	4 (3-5)	8 (6-9)	4 (4-5)	8 (8-10)	3 (3-4)	16 (14-17)	51 (46-55)
≥7 hours	11 (9-12)	2 (1-2)	4 (3-5)	9 (6-10)	4 (3-5)	10 (7-11)	3 (3-3)	15 (14-16)	54 (45-59)
	0.730*	0.129*	**<0.05***	0.815*	0.270*	0.457*	0.868*	**<0.05***	0.281*

Q_1=25% Percentage, Q_2=50% Percentage (median), Q_3=75% Percentage, *Kruskal-Wallis test, **Mann-Whitney U test, COVID-19: Coronavirus disease-2019, CSHQ: Children's sleep habits questionnaire

Children went to bed at 21.37±0.65, slept for 9.59±0.78 hours, and woke up at 8.54±0.72. Parents stated that their children stayed awake for 4.30±3.00 minutes when they woke up at night (not shown in Table).

Table 3 shows the distribution of STSC subscale scores by independent variables. There was a significant relationship between increases in screen time and STSC subscale scores ($p<0.05$). Children watching TV for 0-30 minutes a day had an STSC "approach" subscale score of 2.29-5.14 (arithmetic mean=3.97±0.85). Children watching TV for 4-6 hours a day had an STSC "approach" subscale score of 3.72±0.64. There was a relationship between TV viewing duration and STSC "approach" and "reactivity" subscale scores ($p<0.05$). Children who had a screen time of 0-30 minutes a day had an STSC "rhythmicity" subscale score of 3.00-5.43 (arithmetic mean=4.190±0.63). There was a relationship between screen time and STSC "rhythmicity" subscale scores ($p<0.05$). Children with a total CSHQ score of ≥42 had a mean STSC "rhythmicity" subscale score of 3.80±0.52. Children with a total CSHQ score of ≤41 had a mean STSC "rhythmicity" subscale score of 4.37±0.70. There was a significant relationship between sleep problems and rhythmicity ($p<0.05$).

Table 4 shows the effect of gender and TV viewing duration on sleep problems. The reference categories were male gender and watching TV for 0-30 minutes. The regression analysis had a constant value of 44.172. TV viewing for 31-60 minutes (β=0.298. t=2.915, $p<0.05$), 1-3 hours (β=0.250. t=2.074, $p<0.05$), and for more than four hours (β=0.480. t=3.886, $p<0.05$) had a significant effect on sleep problems. The model had an explanatory power of 13%.

Discussion

This is the first study to investigate the effect of digital screen exposure and temperament on sleep problems in children. Children had a CSHQ score of 35 to 67. Children with clinically significant sleep problems (n=105) had a CSHQ score of 42 to 67. A CSHQ score of ≥42 indicates clinically significant sleep problems (19). Öztürk et al. (21) found that children aged 6-11 years had a mean CSHQ score of 47.92. However, there is no other research with which to compare our findings.

Table 3. Independent variables and STSC subscale scores

	Approach (sociability) (min-max) $\overline{X}$ ± SD	**Persistence (min-max) $\overline{X}$ ± SD**	**Rhythmicity (min-max) $\overline{X}$ ± SD**	**Reactivity (min-max) $\overline{X}$ ± SD**
Increase in TV viewing duration during the COVID-19 pandemic				
Yes	(2.00-6.00) (3.69±0.71)	(2.14-5.71) (3.36±0.60)	(2.86-5.71) (3.89±0.59)	(1.00-4.67) (2.97±0.56)
No	(2.29-5.14) (3.71±0.75)	(2.29-5.43) (3.52±0.68)	(3.14-5.14) (3.88±0.55)	(1.56-4.44) (2.88±0.67)
	0.902*	0.214*	0.906*	0.621*
Increase in screen time (computers/tablets/smartphones) during the COVID-19 pandemic				
Yes	(2.00-6.00) (3.65±0.71)	(2.14-5.71) (3.34±0.57)	(2.86-5.71) (3.82±0.55)	(1.00-4.67) (3.00±0.57)
No	(3.14-5.14) (4.09±0.70)	(2.43-5.43) (3.85±0.86)	(3.57-5.43) (4.41±0.61)	(1.56-3.22) (2.45±0.51)
	<0.05*	**<0.05***	**<0.05***	**<0.05***
TV viewing duration per day during the COVID-19 pandemic				
0-30 minutes	(2.29-5.14) (3.97±0.85)	(2.43-4.86) (3.51±0.79)	(3.00-5.43) (4.22±0.66)	(1.56-4.22) (2.67±0.62)
31-60 minutes	(2.00-4.14) (3.10±0.60)	-	(3.14-5.00) (3.87±0.63)	(2.33-3.78) (2.94±0.41)
1-3 hours	(2.43-6.00) (3.71±0.71)	(2.14-5.57) (3.50±0.67)	(2.86-5.71) (3.82±0.59)	(1.67-4.11) (2.94±0.63)
4-6 hours	(2.57-5.57) (3.72±0.64)	(2.14-5.71) (3.33±0.52)	(3.14-5.43) (3.82±0.49)	(1.00-4.67) (3.05±0.56)
	<0.05**	0.240**	0.051**	**<0.05****
Screen time (computers/tablets/smartphones) per day during the COVID-19 pandemic				
0-30 minutes	(2.29-5.14) (3.75±0.89)	(2.14- 4.71) (3.38±0.67)	(3.00-5.43) (4.19±0.63)	(2.00-4.22) (2.89±0.60)
31-60 minutes	(2.57-5.57) (3.73±0.79)	(2.14-5.71) (3.42±0.79)	(3.00-5.71) (4.01±0.75)	(1.00-3.56) (2.75±0.63)
1-3 hours	(2.71-5.14) (3.69±0.60)	(2.43-5.57) (3.50±0.64)	(2.86-5.00) (3.82-0.49)	(1.56-4.67) (2.97±0.64)
4-6 hours	(2.00-6.00) (3.71±0.66)	(2.57-4.57) (3.36±0.44)	(2.86-4.57) (3.65±0.36)	(2.00-3.67) (3.08-0.42)
≥7 hours	(2.71-4.00) (3.41-0.46)	(2.29-3.57) (3.14±0.46)	(3.14-4.14) (3.71±0.31)	(2.44-4.44) (3.13±0.74)
	0.828**	0.802**	**<0.05****	0.304**
Sleep problem				
No (CSHQ ≤41)	(2.00-6.00) (3.92±1.15)	(2.57-4.86) (3.65±0.69)	(3.00-5.71) (4.37±0.70)	(1.56-4.11) (2.74±0.63)
Yes (CSHQ ≥42)	(2.29-5.57) (3.66±0.62)	(2.14-5.71) (3.36±0.60)	(2.86-5.43) (3.80±0.52)	(1.00-4.67) (2.98±0.57)
	0.294*	0.056*	**<0.05***	0.054*

*Independent groups t-test, **One-Way ANOVA test, SD: Standard deviation, COVID-19: Coronavirus disease-2019, STSC: CSHQ: Children's sleep habits questionnaire, STSC: Short temperament scale for children

Sleep duration, sleep anxiety, daytime sleepiness, and parasomnias are common among children (22). Digital screen addiction is one of the causes of sleep problems (8,11,12). Most of our participants reported that their children had been watching TV (77.9%) and using smart devices (89.3%) much more since the COVID-19 pandemic. Children watching TV for more than 30 minutes had a lower total sleep score and sleep duration, parasomnias, daytime sleepiness subscale scores. There was a relationship between TV viewing duration and sleep duration (<0.05), parasomnias (<0.05), daytime sleepiness (<0.001), and total sleep score (<0.05). A regression model was constructed to determine the effect of gender and TV viewing duration on sleep problems. The model had an explanatory power of 13%. According to the model, TV viewing duration for 31-60 minutes (β=0.298. t=2.915, <0.05), 1-3 hours (β=0.250. t=2.074, <0.001), and more than four hours (β=0.480. t=3.886, <0.001) had a significant effect on sleep problems. Research shows a positive relationship between long TV viewing duration and short sleep duration (11,20). Our results also showed that increased screen time had a significant relationship with sleep duration (<0.05), sleep anxiety (<0.05), daytime sleepiness (<0.05), and total sleep score (<0.05), which is consistent with the literature (23). Research also shows that children have had a longer screen time since the onset of the pandemic (24,25). Three out of every four children aged 12-47 months have been exposed to smart phones and tablets since the pandemic (24). Children who use smart devices more are likely to sleep less (26). Arufe-Giráldez et al. (27) reported increased screen time in children aged 3-4 years, while Dutta et al. (28) found a relationship between more digital screen exposure and less sleep in children during the COVID-19 pandemic. These results confirm that children exposed to digital screens for a more extended period of time have less sleep duration. Digital screen exposure affects every aspect of children's lives, including their development. Therefore, parents should regulate their children's sleep habits and screen time.

Sleep anxiety consists of four dimensions: (1) Needing parents in the room to sleep, (2) being afraid of sleeping away, (3) being afraid of sleeping in the dark, and (4) being afraid of sleeping alone (19). In the present study, age affected children's sleep anxiety and daytime sleepiness and total CSHQ score. Children aged three years had a higher total CSHQ score than those aged 4-6 years (<0.05). Sleep anxiety and daytime sleepiness have an adverse effect on sleep quality and sleep pattern. Tikotzky and Shaashua (29) found that children who had sleep problems at age 1 had the same problems at age 4. Kahraman and Ceylan (17) determined that children aged 3-5 who were hospitalized had trouble falling asleep and had nightmares and that children with sleep anxiety were more ill-tempered and angrier and cried more often. These results are similar to ours. Healthcare professionals should address sleep anxiety and implement interventions to raise parents' awareness.

In the present study, children of parents aged 23-27 years had a median bedtime resistance subscale score of 9, while children of parents aged ≥34 had a median bedtime resistance subscale score of 12. These results pointed to a relationship between mothers' age and children's bedtime resistance (<0.05). To our knowledge, this is the first study to address this phenomenon. All in all, our results indicate that the older the mothers, the more bedtime resistance their children exhibit.

The STSC "reactivity" subscale measures how ready a child is to react to a stimulus or event. The STSC "persistence" subscale refers to the child's ability to concentrate on a task. The STSC "approach (sociability)" subscale determines whether the child tends to approach new people and settings. The STSC "rhythmicity" subscale refers to the regularity of the child's functions (sleep, eating, and elimination) (20). In the present study, there was a significant relationship between screen time and STSC subscale scores (<0.05). There was a significant relationship between TV viewing duration per day and approach (sociability) and reactivity (<0.05). However, there are no other data with which to compare our results. The relationship between TV viewing duration per day and approach (sociability) and reactivity may be because children have been stuck at home and ended up having more screen time since the onset of the COVID-19 pandemic. Children with a CSHQ total score of ≥42 had a mean STSC "rhythmicity" subscale score of 3.80±0.52. Children with a CSHQ total score of ≤41 had a mean STSC "rhythmicity" subscale score of 4.37±0.70. There was a significant relationship between sleep

Table 4. The effect of gender and tvviewing duration on sleep problems

						95% CI		
	B	**Std. error**	**β**	**t**	**p**	**Lower**	**Upper**	**VIF**
(Constant)	44.172	1.481	-	29.835	<**0.001**	41.240	47.104	-
Girl	1.050	1.097	0.083	0.958	0.340	-1.122	3.222	1.002
TV viewing duration for 31-60 minutes	6.623	2.272	0.298	2.915	<**0.05**	2.123	11.123	1.413
TV viewing duration for 1-3 hours	3.516	1.695	0.250	2.074	<**0.001**	0.158	6.874	1.962
TV viewing duration for more than four hours	6.123	1.576	0.480	3.886	<**0.001**	3.003	9.243	2.057
R: 0.366, R^2: 0.134 F: 4.511, p<0.05								
a. Dependent variable: CSHQ **b. Reference categories:** Male gender, TV viewing duration for 0-30 minutes								
CI: Confidence interval, CSHQ: Children's sleep habits questionnaire								

problems and rhythmicity (<0.05). Research also shows that children with high rhythmicity are likely to have more screen time and more sleep disorders (30). In the studies, children with a difficult temperament can get angry quickly and have difficulty in adapting to new situations. It has been found that children with difficult temperaments have shorter sleep times. A difficult temperament can be a helpful predictor in identifying children at risk for insufficient sleep time (31-33).

Ethical Considerations

The study was approved by the Non-Invasive Ethics Committee of the Faculty of Medicine of Selçuk University (decision no: 2021/166). Permission was obtained from the Akşehir Directorate of National Education (2021/E-19581359-605.01.39973) and the Scientific Research Platform of the Ministry of Health (2021-03-02T14_19_11). Permission was obtained from the authors who developed the CSHQ and STSC. The research protocol and approval procedures followed the principles of the Declaration of Helsinki. Parents were informed about the research purpose, procedure, and confidentiality. Informed consent was obtained from those who agreed to participate.

Study Limitations

The study had three limitations. First, the results are sample-specific, and therefore, cannot be generalized. Second, the sample consisted only of parents of children aged 36-72 months. Third, the data were collected online due to the COVID-19 pandemic.

Conclusion

This is a preliminary study to investigate the effect of digital screen exposure and temperament on sleep problems in children. Therefore, policymakers and educators should promote children's health and education during the COVID-19 pandemic. Healthcare professionals should teach parents about sleep problems and raise their awareness of the significance of healthy sleep behaviors. Parents should encourage their children to adopt healthy sleep habits. However, more research is warranted to better understand the relationship between sleep problems and digital screen exposure and temperament.

Ethics

Ethics Committee Approval: The study was approved by the Non-Invasive Ethics Committee of the Faculty of Medicine of Selçuk University (decision no: 2021/166).
Informed Consent: Informed consent was obtained from those who agreed to participate.
Peer-review: Externally and internally peer-reviewed.

Authorship Contributions

Design: B.M., M.T.B, F.Ö., Data Collection or Processing: B.M., M.T.B, F.Ö., Analysis or Interpretation: B.M., M.T.B, F.Ö., Literature Search: B.M., M.T.B, F.Ö., Writing: B.M., M.T.B, F.Ö.
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