



Sleep disturbances in school-aged children 6–12 years during the COVID-19 pandemic in Turkey

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ABSTRACT

Purpose: Sleep disturbances in childhood are an important pediatrics problem because of their influence on children's health and their strong correlation with behavior problems. The aim of the present study was to explore sleep disturbances during the COVID-19 pandemic in school-age children.

Design and methods: A cross-sectional survey design was used for data collection. From 1 to 15 February 2021, the study utilized snowball sampling techniques to gather data through an online survey. Parents of 1040 6–12-year-old schoolchildren completed the Socio-demographic Information Questionnaire and the Children's Sleep Habits Questionnaire. A multivariable logistic regression analysis was employed to pinpoint factors connected to sleep disturbances.

Results: The prevalence of sleep disturbances among 6–12-year-old children during the COVID-19 pandemic in Turkey was 55.5%. The most common sleep disturbances were bedtime resistance, sleep onset delay, and sleep duration. The children's ages, family relationships, and eating habits were linked to their sleep disturbances. Moreover, our results indicated that sleep disturbances were more common in the children of parents who felt helpless, apprehensive, and frightened during the COVID-19 pandemic.

Conclusions: Our work showed that the prevalence of sleep disturbances among school-aged children during the COVID-19 pandemic in Turkey was quite high.

Practice implications: Parents who are worried that their child is sleeping too much or too little should consult their healthcare provider for assessment of a probable sleep disturbance. School nurses should be educated children and their parents about the importance of enough sleep and factors that contribute to inadequate sleep among children during the COVID-19 pandemic.

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Background

The disease termed COVID-19 is an infectious illness caused by a newly detected coronavirus (World Health Organization [WHO], 2021a). On 11 March, 2020, WHO declared the novel coronavirus disease (COVID-19) eruption as a pandemic and called for countries to act immediately and increase the treatment, detection, and reduction of transmission to save human lives (World Health Organization, 2021b). The COVID-19 pandemic represents the biggest worldwide health crisis in a hundred years, presenting formidable health and socio-economic challenges (United Nations Population Fund, 2021). It has direct and indirect effects on children, adolescents, and young adults. In addition to their becoming physically ill, the pandemic has had an impact on their social, emotional, and mental well-being. Trauma faced

during each evolving phase of life may go on to have an effect on individuals throughout their lives (Centers for Disease Control and Prevention, 2021a).

Children and adolescents of all ages and in all countries are seriously suffering from the consequences of the pandemic. COVID-19-related measures are having a profound effect on their health and well-being and for some; the impact will be lifelong (World Health Organization, 2021c). The pandemic and the associated preventative policies of isolation and social distancing affect nearly all sectors of a child's environment (Organisation for Economic Co-operation and Development, 2021). The emotional difficulties experienced by children and teenagers are aggravated by family stress and social isolation. Some even face increased abuse, interrupted education, and doubts over their futures coming at crucial points in their emotional development (United Nations, 2021).

Turkey has been one of the countries most affected by COVID-19, with the first case reported on 11 March, 2020 (Republic of Turkey Ministry of Health, 2020). To decrease the risk of contagion, the government

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adopted a series of public actions. All primary, middle and high schools and universities in Turkey were closed, effective the following Monday, 16 March, 2020. Distance education/televised education then commenced for the primary, middle, and high schools after a one-week mid-semester break. In order to limit the transmission of the coronavirus, Turkey put stay-at-home orders in place for those over the age of 65 on 21 March, whereas those under 20 years old were placed under this restriction beginning from 3 April (WHO Regional Office for Europe, 2020).

Sleep disturbances pose a significant pediatric challenge due to their effects on children's well-being. They are also a social problem, as sleep disturbances correlate highly with behavioral problems (World Health Organization, 2004). The current stressful circumstances of isolation at home and big changes in daily schedules, higher levels of anxiety, less exposure to sunlight, more exposure to blue-light with the high use of digital media, dietary changes, and less physical exercise could all be factors that contribute negatively to sleep quality (Zreik et al., 2021). In addition, sleep disturbances may also be connected to elevated stress stemming from possible insecurities about family income and health issues as well as from doubts about the future (Bruni et al., 2021).

In spite of the obvious impact of the COVID-19 pandemic on family life and its possible negative effects on sleep, one knows little about how the sleep patterns of parents and children have been influenced by the present-day crisis (Zreik et al., 2021). There are several studies on sleep disturbances in children during the COVID-19 lockdown. The study of Bruni et al. (2021) demonstrated that the COVID-19 lockdown in Italy resulted in a delayed sleep/waking schedule in all age groups of children. All groups except teenagers also exhibited increased sleep disturbances (Bruni et al., 2021). Another study on Chinese preschoolers (4–6 years of age) revealed changes in sleep patterns, typically later bedtimes and wake-up times, longer nighttime sleep, and shorter napping periods (Liu et al., 2021).

As many more countries have now carried out comparable policies of home-confinement, it is especially important to comprehend their impact on the sleep of children, as well as the factors that may ease or magnify that impact (Liu et al., 2021). Relatively little is known about the impact of the COVID-19 pandemic on sleep disturbances among school-aged children (6–12 years of age) in Turkey. Therefore, the aim of the present study was to investigate sleep disturbances during the COVID-19 pandemic in schoolchildren aged 6–12 years. These findings may prove helpful in developing effective strategies for screening and providing interventions to lower the negative outcomes related to sleep disturbances during the COVID-19 phenomenon.

Methods

Study design and population

A cross-sectional survey design was used for data collection. From 1 to 15 February 2021, the study utilized snowball sampling techniques to gather data through an online survey. Those to participate were contacted through various social media. The only inclusion criterion was being the parent of a child between 6 and 12 years of age. Mothers with more than one child within the same age range were told to report on the youngest child. Parents of 1040 6–12-year-old schoolchildren completed the Socio-demographic Information Questionnaire and the Children's Sleep Habits Questionnaire (CSHQ). Participating parents filled out the anonymous online questionnaire after having read the informed consent form and giving their explicit agreement to take part in the survey.

Data collection tools

Socio-demographic information form

The aim of the questions contained in the form was to get an overview of the children's socio-demographic status and characteristics.

Socio-demographic information collected included data on the child's sex, age, family type, residence, father's education, and mother's education. In addition, parents reported information regarding the child's excessive screen use and gaming, increased of physical inactivity, and increased eating frequency (with response options of "yes" or "no"), as well as on parent's self-reported factors such as family income (with response options of "lower", "middle" or "higher"), family relationships (with response options of "good", "average" or "poor"), close contact with someone who has tested positive for COVID-19 (with response options of "yes" or "no"), feeling frightened, apprehensive, and helpless due to COVID-19 pandemic (with response options of "yes" or "no"), and the presence of a household member testing positive for COVID-19 (with response options of "yes" or "no").

The Children's Sleep Habits Questionnaire (CSHQ)

The CSHQ is a parent-reported sleep instrument widely used to evaluate sleep disturbances in young children (Owens, Spirito, & McGuinn, 2000). The CSHQ contains 33 items, rated using scores ranging from "usually" to "rarely." Parents were requested to report sleep behavior occurring in a "typical" recent week. Items were scored on a three-point scale based on frequency of the sleep disturbances: 5–7 times/week = "usually"; 2–4 times/week = "sometimes"; and 0–1 time/week = "rarely". The order of some items was reversed in order for more disturbed sleep to consistently receive a higher score. These sleep disturbances were then assessed according to eight subscales: 1) Bedtime Resistance, 2) Sleep Onset Delay, 3) Sleep Duration, 4) Sleep Anxiety, 5) Night Waking, 6) Parasomnias, 7) Sleep-Disordered Breathing, and 8) Daytime Sleepiness. The more severe disturbances were signified by higher total scores and subscale scores. In addition, three items on the questionnaire dealt with sleep patterns in terms of bedtime, wake-up time, and total sleep duration. A total score of >41 was the recommended clinical cut-off point for sleep disturbance (Owens, Spirito, & McGuinn, 2000). In addition, based on previous studies (Takahashi et al., 2017), for this study, the cut-off point for each subscale on the CSHQ was set as 2 SD above the mean score of a community sample (Owens, Spirito, & McGuinn, 2000). The validity study was prepared in Turkish by Perdahli Fis et al. (2010). The reliability of the scale according to Cronbach's alpha was 0.78 (Perdahli Fis et al., 2010).

Ethics approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The study was approved by the Ethics Committee of the Gümüşhane University.

Statistical analysis

Statistical analyses were conducted using SPSS for Windows Version 20. Descriptive analyses (means, standard deviations, percentages, and frequencies) were performed on all variables and the prevalence of sleep disturbances. The chi-squared (χ^2) test was applied to compare categorical variables, as numbers (n) and percentages (%). A multivariable logistic regression analysis was carried out to identify the factors correlated to sleep disturbances. Results were taken as statistically significant at $p < 0.05$.

Results

The socio-demographic characteristics of the children and the relationships between sleep disturbances and socio-demographic characteristics are provided in Table 1. Of the 1040 children, 528 (50.8%) males and 512 (49.2%) females were included in the analyses. The mean age of the children was 9.16 ± 2.05 , and 80.3% were aged between 9 and 12 years. The majority (83.8%) of the children were in a

Table 5
Risk factors for sleep disturbances identified by multivariable logistic regression analysis.

Variables	Categories	B	p	AOR	95.0% C.I.	
					Lower	Upper
Child age, year	6–8 years	0.50	0.00	1.65	1.26	2.16
	9–12 years ^a	-	-	1.00	-	-
Family relationship	Good ^a	-	-	1.00	-	-
	Average	0.13	0.29	1.14	0.88	1.49
	Poor	1.25	0.00	3.49	1.68	7.27
Parents who have been in close contact with someone who has COVID-19	Yes	0.05	0.73	1.05	0.78	1.40
	No ^a	-	-	1.00	-	-
Parents who felt horrified, apprehensive, and helpless due to COVID-19	Yes	0.51	0.00	1.66	1.26	2.20
	No ^a	-	-	1.00	-	-
Someone in household who tested positive for COVID-19	Yes	0.47	0.00	1.60	1.14	2.25
	No ^a	-	-	1.00	-	-
Excessive screen use and gaming during COVID 19 pandemic	Yes	0.21	0.12	1.23	0.94	1.61
	No ^a	-	-	1.00	-	-
Increased eating frequency	Yes	0.38	0.00	1.46	1.12	1.91
	No ^a	-	-	1.00	-	-
Constant		0.66	0.00	0.51		

^a Reference group, AOR: Adjusted odds ratios.

identified a much higher prevalence of sleep disturbances during the COVID-19 pandemic. A national survey in the United States in 2015 found that the occurrence of sleep disturbances was 43% among elementary schoolchildren (Surani et al., 2015). In a 2021 study in Iran, 26.7% of elementary-school students reported experiencing sleep disturbances (Amizadeh et al., 2021). A more recent study found that overall, problematic levels of sleep-related disturbances were often reported by subjects from all age groups, with 22.6% of children and 20.0% of teenagers affected (Lewien et al., 2021).

The present study found that bedtime resistance, sleep onset delay, and sleep duration were the most prevalent sleep disturbances during the COVID-19 crisis. The findings from the present study are consistent with those of prior studies. Bruni et al. (2021) demonstrated that in Italy, confinement due to COVID-19 caused a big delay in the sleep/wake-up schedules of children in all age groups as well as an escalation of sleep disturbances in all groups except teenagers (Bruni et al., 2021). In another recent study conducted in Italy during the lockdown, children exhibited a clear delay in sleep timing—i.e., later bedtime/wake-up time—and a mild deterioration in sleep quality (Cellini et al., 2021).

Several studies have found that sleep disturbances were more likely to be related by parents in younger children than in older children (Kim et al., 2017; Owens, Spirito, McGuinn, & Nobile, 2000). As with previous studies, this study found a relatively higher prevalence of sleep disturbances in younger (6–8 years of age) than in older (9–12 years of age) children. This finding may be partially attributed to the fact that the older children were less likely to report sleep disturbances to their parents. For the most part, the parents monitored the younger children during their sleep; however, because the older children slept alone it may have been difficult for them to recognize sleep disturbances in this group, and this could have affected their survey answers (Kim et al., 2017).

In our study, poor family relationships were found to be associated with an increased risk of sleep disturbances among 6–12-year-old schoolchildren. Similarly, in other studies, troubled family relationships during childhood and the teen years were also associated with sleep disturbances (Gregory et al., 2006). For example, sleep disturbances in a sampling of Chinese schoolchildren were found to be linked to poor relationships between their parents (Liu et al., 2000). Another study including more than 100,000 Japanese teenagers attributed the lack of a close relationship with parents to a variety of sleep disturbances, including difficulties in going to sleep and short duration of sleep (Ohida et al., 2004).

This study found that increased eating frequency was associated with sleep disturbances among schoolchildren aged 6–12 years. Literature is

emerging that links sleep disturbances in both mature and immature populations with higher food consumption. Specifically, research on adults also indicates that disrupted sleep patterns induce both a homeostatic and a non-homeostatic impulse to eat (Hogenkamp et al., 2013). First, the homeostatic compulsion to eat after sleep disruption may escalate as the body tries to make up for the nocturnal energy deficiency resulting from increased wakefulness and the resulting rise in spent energy. Research indicates that changes in homeostatic, emotional, cognitive, and behavioral factors following sleep disturbances may also impact each other, further amplifying the impact of sleep disruption on the increased consumption of food (Lundahl & Nelson, 2015).

During the COVID-19 emergency, people fear infection, death, and the loss of family members. Repeated media images of patients in intensive care, the dead, and coffins augment the fear (United Nations, 2021). Fear, anxiety, and stress are normal reactions to imagined or real threats when one encounters uncertainty or the unknown. Consequently, it is normal and understandable that many people suffer apprehension under the circumstances surrounding the COVID-19 pandemic (World Health Organization, 2021d).

This study demonstrated that sleep disturbances were more common among children of parents who felt frightened, apprehensive, and helpless due to the COVID-19. The study also found that sleep disturbances were more common among families with a household member who had tested positive for COVID-19. The increased fear of COVID-19 pandemic experienced by children reflects the escalating fears of their parents. This can be explained in various ways. Thus, parental fears and anxieties can be transmitted to their children, either via genetic or environmental means. Environmental factors possibly explaining intergenerational transmission include parental stress, parenting approaches, parent-child relationships, or characteristics such as the temperament or cognitive abilities of the child. Moreover, this effect acts in both directions. Greater levels of fear and anxiety in children can also be linked to the higher levels in their parents. Research has indicated that increased COVID-19 anxieties and fears in families and children are correlated with the COVID-19 pandemic and lockdowns. Other studies have also found a strong association between family sleep habits and the children's COVID-19-related fears (Suffren et al., 2021).

Practice implications

Children may worry about catching COVID-19 or about their loved ones falling ill from it. Disproportionate worry or depression, unhealthy eating or sleeping habits, and attention deficit or difficulty in concentrating are some signs of stress in children. There are measures that parents can take to ensure stability and to support their children and help them cope. Children and teens react, to a degree, according to the models provided by the adults around them. The best reassurance for children is seeing their parents and caregivers dealing with the COVID-19 panic in a calm and confident manner. Parents can be more encouraging to those around them, especially their children, if they are better prepared themselves (Centers for Disease Control and Prevention, 2021b).

The importance of sleep quality and sleep schedules for children should be emphasized and disseminated via public health policy communiqués (e.g., radio ads, TV announcements, or school newsletters). On the environmental level, parents and guardians should encourage physical activity and sunlight exposure during the day, and establish bedtimes/wake-up times that do not differ by more than 30 min from night to night. Laptops, tablets, smart phones, etc. should be removed from bedrooms 30 min before bedtime to limit blue light exposure. On the intra-individual level, developmentally appropriate training tools on COVID-19 should be used for family discussions aimed at easing the children's feelings of anxiety. Prior to sleep, time spent online could be replaced by stories read by extended family members/friends over the phone in order to encourage emotions of family closeness and connectedness for the children. On the inter-individual level, prior to sleep,

Table 1
Socio-demographic characteristics of children association to sleep disturbances.

Characteristics	Total		Sleep disturbances				p ^a
			No (CSHQ score ≤ 41)		Yes (CSHQ score > 41)		
	n	%	n	%	n	%	
Child gender							
Male	528	50.8	235	44.5	293	55.5	0.99
Female	512	49.2	228	44.5	284	55.5	
Child age, year (Mean ± SD = 9.16 ± 2.05)							
6–8 years	205	19.7	149	37.5	248	62.5	0.00
9–12 years	835	80.3	314	48.8	329	51.2	
Types of family							
Extended family	125	12.0	49	39.2	76	60.8	0.43
Nuclear family	872	83.8	395	45.3	477	54.7	
Single parent family	43	4.1	19	44.2	24	55.8	
Living areas							
Rural	69	6.6	26	37.7	43	62.3	0.23
Urban	971	93.4	437	45.0	534	55.0	
Father's education							
≤ Secondary school	185	17.8	75	40.5	110	59.5	0.23
≥ High school	855	82.2	388	45.4	467	54.6	
Mother's education							
≤ Secondary school	205	19.7	86	42.0	119	58.0	0.40
≥ High school	835	80.3	377	45.1	458	54.9	
Family relationship							
Good	569	54.7	270	47.5	299	52.5	0.00
Average	424	40.8	183	43.2	241	56.8	
Poor	47	4.5	10	21.3	37	78.7	
Family income							
Lower	47	4.5	13	27.7	34	72.3	0.05
Middle	888	85.4	400	45.0	488	55.0	
Higher	105	10.1	50	47.6	55	52.4	
Total	1040	100.0	463	44.5	577	55.5	

^a Pearson Chi-Square Test.

nuclear family. According to residence, 971 (93.4%) were from an urban area and 69 (6.6%) were from a rural area. The majority of their fathers (82.2%) and mothers (80.3%) had at least a high-school education. Poor family relationships were reported by 47 (4.5%) of the parents. The majority (85.4%) of parents reported having middle family income. Sleep disturbances were found to be significantly associated with 6–8 years of age, and poor family relationships ($p < 0.05$). No significant differences were found between sleep disturbances and the child's sex, type of family, residence, father's education, mother's education, or family income ($p > 0.05$) (Table 1).

Sleep habits of the 6–12 year-old children during the COVID-19 pandemic (Table 2) included the mean bedtime of 10:51 p.m. (SD = 1.25), the mean wake-up time as 9:07 a.m. (SD = 1.22), and the mean sleep duration as 9.47 h (SD = 2.12).

The total scores for the CSHQ and the subscales are given in Table 3, which indicates that about 55% of the children achieved a score above the total CSHQ cut-off score, whereas >50% scored higher than the cut-off for the three subscales of bedtime resistance (51.9%), sleep onset delay (61.4%), and sleep duration (90.2%).

Sleep disturbances were found to be significantly associated with parents who have been in close contact with someone who has COVID-19, parents who felt fearful, apprehensive, and helpless because of COVID-19, and with the presence of a household member who had tested positive for COVID-19 ($p < 0.05$). No statistically significant

Table 2
Child's sleep habits during the COVID-19 pandemic.

	Mean	SD
Bedtime (p.m.)	10:51	1:25
Wake-Up Time (a.m.)	9:07	1:22
Sleep duration (hours)	9.47	2.12

Table 3
The prevalence of sleep disturbances among school-age children 6–12 years during the COVID-19 pandemic.

CSHQ subscales	Mean	SD	Cut-off value	Score			
				≤ cut-off value		> cut-off value	
				n	%	n	%
Bedtime Resistance	11.16	2.02	10.8	500	48.1	540	51.9
Sleep Onset Delay	2.47	0.72	2.3	401	38.6	639	61.4
Sleep Duration	6.76	0.92	5.3	102	9.8	938	90.2
Sleep Anxiety	6.52	2.36	7.8	696	66.9	344	33.1
Night Wakings	3.82	1.25	5.3	936	90.0	104	10.0
Parasomnias	8.28	1.60	10.6	925	88.9	115	11.1
Sleep Disordered Breathing	3.26	0.76	4.5	967	93.0	73	7.0
Daytime Sleepiness	11.25	2.68	15.2	964	92.7	76	7.3
Total CSHQ score	43.68	7.58	41.0	463	44.5	577	55.5

association was found between sleep disturbances and increased lack of physical activity ($p > 0.05$) (Table 4).

Table 5 presents the logistic regression analysis results for the independent factors and sleep disturbances. Factors that were significantly correlated with sleep disturbances ($p < 0.05$) included the following: 6–8 years of age (adjusted odds ratio – AOR – of 1.65, 95% CI 1.26 to 2.16), a poor family relationship (AOR 3.49, 95% CI 1.68 to 7.27), parents who felt frightened, apprehensive, and helpless due to the COVID-19 pandemic (AOR 1.66, 95% CI 1.26 to 2.20), the presence of a household member who had tested positive for COVID-19 (AOR 1.60, 95% CI 1.14 to 2.25), and the child's increased eating frequency (AOR 1.46, 95% CI 1.12 to 1.91). No statistically significant association was found between sleep disturbances and parents who had been in close contact with someone who has tested positive for COVID-19 or excessive screen use and gaming during COVID 19 pandemic ($p > 0.05$).

Discussion

In this study, the prevalence of sleep disturbances was 55.5% among schoolchildren 6–12 years of age during the COVID-19 pandemic. Compared to the findings of other research prior to the epidemic, our study

Table 4
Associations between sleep disturbances with parent-reported characteristics and children's lifestyle risk factors during the COVID-19 pandemic.

Characteristics	Sleep disturbances				p ^a
	No		Yes		
	n	%	n	%	
Parents who have been in close contact with someone who has COVID-19					
Yes	155	40.1	232	59.9	0.02
No	308	47.2	345	52.8	
Parents who felt horrified, apprehensive, and helpless due to COVID-19					
Yes	113	34.9	211	65.1	0.00
No	350	48.9	366	51.1	
Someone in household who tested positive for COVID-19					
Yes	83	35.5	151	64.5	0.00
No	380	47.1	426	52.9	
Excessive screen use and gaming during COVID 19 pandemic					
Yes	272	40.7	396	59.3	0.00
No	191	51.3	181	48.7	
Increased of physical inactivity					
Yes	365	44.0	464	56.0	0.52
No	98	46.4	113	53.6	
Increased eating frequency					
Yes	190	39.7	288	60.3	0.00
No	273	48.6	289	51.4	
Total	463	44.5	577	55.5	

^a Pearson Chi-Square Test.

awareness-based stress-reduction techniques including listening to guided meditation recordings or relaxing music/sounds or performing gentle yoga could help ease anxiety and negative psychological states and improve the quality of sleep (Bates et al., 2020).

The impacts of the pandemic have already had profound mental health consequences and will continue to do so. Intervening as early as possible with families could allow interferences to be put in place before children develop more sleep disturbances. Parents who are worried that their child is sleeping too much or too little should consult their healthcare provider for assessment of a probable sleep disturbance. Finally, specific training programs for children with sleep disorders and their parents should be established. School nurses and other healthcare personnel should be educated children and their parents about the importance of enough sleep and factors that contribute to inadequate sleep among children during the COVID-19 pandemic. Mental health actions need to be considered essential components of the national response to COVID-19.

Limitations

There are some limitations in our study. First, a cross-sectional study design was used to evaluate sleep disturbances based on parental reports. Measurement agreement in sleep disturbances between objective measure and self-reports, as well as between parent's and child's reports, is not high (Owens, Maxim, Nobile, McGuinn, & Msall, 2000). Parents might not have been aware of their children's sleep disturbances, in particular, those of their older children (Chen et al., 2019). Second, we chose the snowball sampling strategy because the resources available were limited and the COVID-19 pandemic was time-dependent. The snowball sampling strategy was not based on random selection of the sample, nor did the study population represent the actual pattern of the general population.

Conclusion

In conclusion, sleep disturbances among schoolchildren aged 6–12 years during the COVID-19 pandemic in Turkey are unacceptably high. The most common sleep disturbances observed were bedtime resistance, sleep onset delay, and sleep duration. The child's age, family relationships, and eating habits were associated with the sleep disturbances. Moreover, our results indicated that sleep disturbances were more prevalent in the children of parents who felt helpless, apprehensive, and fearful during the COVID-19 pandemic.

Declarations of interest

The authors declare that there is no conflict of interest.

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