

Impact of COVID-19 pandemic on elementary school children's sleep hygiene

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Abstract

The effect on sleep in elementary school-age, healthy children during the pandemic has been studied in various online survey studies with varied conclusions. However, no research study has been conducted in North Macedonia to examine the impact of the pandemic on the prevalence of sleep problems among elementary school-age children. Therefore, the present study is focused on exploring sleep patterns, sleep disturbances, and other associated factors during the COVID-19 pandemic outbreak in elementary school children. Approximately 85 respondents were surveyed from a public elementary school in North Macedonia. The Children Sleep Habits Questionnaire was used to assess children's sleep habits. From the research, we were able to conclude that children aged 7-8, are more prone to experiencing few sleep subscales that relate to common sleep problems such as bedtime resistance, sleep anxiety, night waking, and parasomnia while children at aged 10-11 would perform more sleep onset delays than younger ones.

Keywords: children's mental health, sleep patterns, sleep health, sleep disruptions, COVID-19.

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1. Introduction

Quality and appropriate sleep are valuable for the growth and development of children (Knowland et al., 2020). Referring to the latest findings and studies which have been conducted to research the impact of the current pandemic on children's sleep hygiene and their overall well-being have found frequent alterations in sleep habits; increased total sleep duration and a negative impact on sleep quality.

Sleep disorders bring many problems along with them (Jahrami et al., 2022, Liao et al., 2022). Therefore, many correlated risk factors of distress have been investigated as independent variables, and many authors have come to an understanding that there is an increase in sleep disorders that significantly impact the quality of children's life and mental well-being (Dondi et al., 2021).

The psychological distress due to the pandemic outbreak has become part of all major stages of the human life circle, excluding children. Especially during the lockdown, as a safety measure, which confined the children to their homes for an extended period, with schools remaining closed and students only allowed to follow online lessons, to reduce contagion and pressure on the healthcare system, there have always been concerns that because of the prolonged home confinement during a disease outbreak may affect the physical and mental health of children (Wang et al., 2020), and not only them.

For the sake of children's well-being and to maintain their potential at doing their assessments, it is crucial for them that they have a good quality of sleep at night. During home confinement, sleep issues emerge, which only trigger an increase in stress and anxiety levels, and which may bring a decrease in the overall quality of their life (Lu et al., 2022).

The loss of social contact; the reduction of physical activity; the need to play with their school-mates to achieve their social development skills; the lack of sunlight exposure which may as well intrude with the flexibility in wake/sleep time, socio-emotional struggles due to changes in their family dynamic and overall mood among the family members due to various factors, the increase of screen-time and the changes in their eating habits, and many more to count, are enough reasons to doubt that the children in our place are facing with not so common sleeping problems (Brooks et al., 2020; Becker & Gregory, 2020; Dellagiulia et al., 2020). These changes can not only impact daily activities as well as the sleep/wake pattern and circadian rhythmicity (Altena et al., 2020; Golberstein, Wen, & Miller, 2020; Gualano et al., 2020).

Having in mind that sleep disorders may trigger many other psychological issues along with them and that the quality of sleep is very important for children's growth and development (Moore et al., 2020; Liu et al., 2021), we find it very crucial to study the prevalence of sleep disruptions during the pandemic COVID-19 among children.

1.1. Purpose of study

The purpose of the present study is to provide detailed data on the impact of the COVID-19 pandemic outbreak on children's sleep patterns and sleep disturbances, as well as highlight the importance of the link between sleep health and family-related factors. With this survey, we aimed to evaluate the effects of the COVID-19 pandemic on sleep quality as an indicator of psychological well-being among children living in North Macedonia. Secondly, we aimed to identify potential familial, socioeconomic, and personal risk factors for their occurrence.

1.2. Hypothesis

- H1.** 2nd-grade children experience higher levels of sleep disruptions than 5th-graders in all sleep subscales.
- H2.** Younger school-age children experience more sleep disturbances and anxiety than older ones.
- H3.** Sleep anxiety and bedtime resistance positively correlate with one another.

H4. Sleep anxiety impacts the onset of bedtime resistance behaviors in elementary school children.

H5. Children who experience night waking are more predisposed to experience parasomnia issues.

2. Materials and methods

2.1. Data collection instrument

For the assessment of the sleep patterns and disturbances among children, we have used the Children Sleep Habits Questionnaire which is apparent—a rated questionnaire that evaluates common pediatric sleep difficulties.

2.2. Participants

For sampling, we have used the 'snowball' sampling technique, which is an online software platform, the one we used to be called Survey Planet. We have selected the participants of this study by cluster sampling in the city of Struga, in a public elementary school, in North Macedonia. The survey included 85 respondents divided by their school year (2nd and 5th grade).

2.3. Analysis

The data were analyzed with the SPSS statistical software version 22.

2.4. Ethics

Since the participants were elementary school students, oral permission was sought from their parents and guardians. Written permission was also sought from the authorities in their school.

3. Results

Regarding the data that we have analyzed, we have been able to come to these findings which indicate that 2nd graders experience higher moderate levels of sleep disruptions, while high levels of these disruptions weren't met in the representative percentage to be mentioned.

We have concluded that children at age 7-8 that experience moderate levels of sleep anxiety are (%= 48.8) of our population, while only (%=27.3) from 5th graders are experiencing moderate levels of sleep anxiety. Bedtime resistance is also more present in 2nd graders (%=43.90) whose percentage of those who exhibit these issues at moderate levels exceeds those of 5th graders (%=27.27) significantly. Night waking issues are expressed at a moderate level in younger pupils in (%29.27), while 10-11-year-old pupils (%18.18) exhibit such sleep issues. For parasomnia disorders, we have found out that such symptoms are detected at (%=29.27) in 2nd graders and (%=13.64) in 5th graders. Daytime sleepiness disorder isn't a concern in our population, since more than 92% of the respondents haven't met its symptoms in their everyday life. The only sleep disruption in which 5th graders exceed the percentage of the sleep issues present at a moderate level, the 2nd graders, is sleep onset delay, on which 5th graders achieve (%=38.64) and 2nd graders have (%=26.83).

Through the implementation of this study, we have been able to come to a finding that sleep anxiety and bedtime resistance are positively correlated with one another. The correlation is ($r=0.731$) which indicates a strong correlation between these two variables, meaning that with an increase in sleep anxiety, the children's probability of bedtime resistance also grows, and vice versa (table 1).

Table 1
Correlations

		Sleep Anxiety	Bedtime resistance
Sleep Anxiety	Pearson Correlation	1	.731**
	Sig. (2-tailed)		.000
	N	85	85
Bedtime resistance	Pearson Correlation	.731**	1
	Sig. (2-tailed)	.000	
	N	85	85

** . Correlation is significant at the 0.01 level (2-tailed).

Regression test has confirmed our hypothesis that sleep anxiety does influence the onset of bedtime resistance issues. Through our findings, we were able to come to the following findings in Table 2:

Table 2
Model Summary

Model	R	R Square	Adjusted Square	R	Std. The error in the Estimate
1	.731 ^a	.534	.528		2.247

a. Predictors: (Constant), Sleep Anxiety

b. Dependent Variable: Bedtime resistance

The *R*-value represents the simple correlation and is $R=0.73$ which indicates a high degree of correlation, while looking at the adjusted *R* square data, we come to an understanding that R^2 (0.53×100) = 53% of the variance in bedtime resistance is predicted by sleep anxiety.

Table 3
ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	480.192	1	480.192	95.109	.000 ^b
	Residual	419.055	83	5.049		
	Total	899.247	84			

a. Dependent Variable: Bedtime resistance

b. Predictors: (Constant), Sleep Anxiety

Table 3 indicates that the regression model predicts the dependent variable significantly well. The model is significant $F(1,83) = 96.11$, ($p=0.00 < 0.01$), which indicates that, overall, the regression model statistically significantly predicts the outcome variable. Sleep anxiety accounted for 53% of the explained variability in bedtime resistance. The regression equation was predicted bedtime resistance = $2.43 + 9.21x$ (sleep anxiety).

Table 4 of the tests of equality if covariance matrices, provides evidence that the equal variance assumption is satisfied since ($p=0.655 >0.01$).

Table 4
Box's Test of Equality of Covariance Matrices

Box's M	1.665
F	.540
df1	3
df2	1483448.696
Sig.	.655

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

a. Design: Intercept + Q1

Table 5 displays the multivariate tests, whereas Table 6 displays the tests of between-subjects effects.

Table 5
Multivariate Tests

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.974	1540.112 ^b	2.000	82.000	.000	.974
	Wilks' Lambda	.026	1540.112 ^b	2.000	82.000	.000	.974
	Hotelling's Trace	37.564	1540.112 ^b	2.000	82.000	.000	.974
	Roy's Largest Root	37.564	1540.112 ^b	2.000	82.000	.000	.974
School grade	Pillai's Trace	.152	7.365 ^b	2.000	82.000	.001	.152
	Wilks' Lambda	.848	7.365^b	2.000	82.000	.001	.152
	Hotelling's Trace	.180	7.365 ^b	2.000	82.000	.001	.152
	Roy's Largest Root	.180	7.365 ^b	2.000	82.000	.001	.152

a. Design: Intercept + Q1

b. Exact statistic

Table 6
Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Sq
Corrected Model	Total Sleep	655.933 ^a	1	655.933	10.978	.001	.117
	Sleep Anxiety	458.512 ^b	1	458.512	14.780	.000	.151
Intercept	Total Sleep	155199.604	1	155199.604	2597.524	.000	.969
	Sleep Anxiety	40518.230	1	40518.230	1306.135	.000	.940
School year	Total Sleep	655.933	1	655.933	10.978	.001	.117

	Sleep Anxiety	458.512	1	458.512	14.780	.000	.151
Error	Total Sleep	4959.172	83	59.749			
	Sleep Anxiety	2574.782	83	31.021			
Total	Total Sleep	160296.000	85				
	Sleep Anxiety	43298.000	85				
Corrected Total	Total Sleep	5615.106	84				
	Sleep Anxiety	3033.294	84				

a. R Squared = .117 (Adjusted R Squared = .106)

b. R Squared = .151 (Adjusted R Squared = .141)

There was a significant difference between younger (7-8 y.o) and older pupils (10-11y.o) when considered jointly on the variables of sleep issues in general and sleep anxiety, Wilks $\Lambda=0.85$, $F=7.36$, $p=0.01$, partial $\eta^2=0.15$. A separate ANOVA was conducted for each dependent variable, with each ANOVA evaluated at an alpha level of .025. There was a significant difference between 2nd and 5th graders on general sleep disruptions $F(1,83) = 10.98$, partial $\eta^2=0.12$, with 2nd graders ($M=45.54$) scoring higher than 5th graders ($M= 39.98$). Also, there was a significant difference between 2nd and 5th graders on general sleep anxiety $F(1,83) =14.78$, partial $\eta^2=.0.15$ with means with 2nd graders ($M=24.17$) scoring higher than 5th graders ($M= 19.52$).

A linear regression established that night waking could significantly predict parasomnia issues $F(1,83) =70.57$, $p=0.001<0.01$, and night waking accounted for 45% of the explained variability in parasomnia sleep disorders.

Table 7 displays the model summary for night wakings and Parasomnia total, whereas Table 8 displays the coefficients of the relationship.

Table 7

Model Summary

Model	R	R Square	Adjusted Square	R	Std. The error in the Estimate
1	.678 ^a	.460	.453		2.120

a. Predictors: (Constant), Night wakings

b. Dependent Variable: Parasomnia total

Table 8

Coefficients

Model		Unstandardized Coefficients		Standardize	T	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	d Coefficient			Lower Bound	Upper Bound
1	(Constant)	3.492	.707		4.942	.000	2.087	4.897
	Night wakings	.912	.109	.678	8.402	.000	.696	1.128

a. Dependent Variable: Parasomnia total

These findings confirm our hypothesis that “children who experience night waking are more predisposed to experience parasomnia sleep issues”.

4. Discussion

Second graders experience higher moderate levels of these sleep disruptions: sleep anxiety; bedtime resistance; night waking and parasomnia, in comparison to 5th graders who exceed them at only one sleep subscale which is: sleep onset delay. On the subscale of daytime sleepiness disorder, wasn't found significant differences between the respondents because the majority of each group of respondents didn't manifest any symptoms correlated to this sleep disorder.

We concluded that sleep anxiety and bedtime resistance are positively correlated with each other, meaning that the pupils that experience higher levels of anxiety are those who are more highly predisposed to exhibit bedtime resistance as well. Throughout the implementation of the linear regression test, we came to a finding that 53% of the variance in bedtime resistance is predicted by sleep anxiety. These findings corroborate those of Scapatucci et al., (2022) and Knowland et al., (2022).

We also came to an interesting finding through the ANOVA tests, that there was a significant difference between 2nd graders (7-8 y.o) and pupils in 5th grade (10-11y.o) when considered jointly on the variables of sleep issues in general and sleep anxiety, having the 2nd graders in advantage, scoring higher in both mentioned variables. And finally, this brings us to an understanding that the sleep subscale of night waking can significantly predict parasomnia sleep disorders for 45%.

5. Conclusion

This study provides the opportunity to conceive a general idea about children's sleep quality or sleep disruptions that can be used as guidelines on lifestyle behavior recommendations and psychotherapeutic approaches for the children. It was essential to study the impact of the COVID-19 pandemic on children referring to sleep disturbances, having into consideration that they may trigger neurobehavioral disorders or increase the frequency of occurrence of present, existent disease. Hence, there was a need to comprehensively study the repercussions of the pandemic and the safety measures on children's sleep hygiene.

In summary, our research study findings have highlighted the importance of children's sleep health during the pandemic outbreak. I think that future studies should include an assessment of other factors that could be related to sleep disruptions such as health concerns, academic performance during the period through e-learning, the family's financial stability, social anxiety due to social isolation, etc. to further explore and contribute to children's mental health. Sleep anxiety correlates positively and impacts bedtime resistance significantly, and children who have night-waking sleep issues are those who also suffer more from parasomnia sleep symptoms.

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