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COVID-19-Related Emotional Impact and Personal Experiences, Family Income, and Sleep Hygiene of Early Appalachian Adolescents

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Objectives: The coronavirus disease 2019 (COVID-19) pandemic has negatively impacted the lifestyles and routines of adolescents, making it difficult to prioritize sleep. This has raised concerns regarding the sleep hygiene of young individuals, as good sleep is important for healthy youth development. Therefore, understanding how the pandemic has disproportionally affected the sleep of specific youth subgroups is essential for developing interventions to alleviate poor sleep and its adverse consequences. **Methods:** School-based survey data from the Young Mountaineer Health Study (YMHS) was used to create generalized estimating equation models to predict daytime sleepiness and the amount of sleep among early adolescents on weekday and weekend nights. The study included data from 2,322 students collected over three waves ~6 months apart. COVID-19-related emotional impact (scale range: 5–25) was considered the independent variable. **Results:** The average age of the participants in wave 1 was 11.50 (male, 44.1%). COVID-19-related emotional impact was positively associated with daytime sleepiness (estimate=0.25, $p<0.001$) and increased the odds of receiving less than the recommended average amount of sleep on weekdays (odds ratio [OR]=1.05, $p<0.001$) and weekends (OR=1.04, $p<0.001$). **Conclusions:** Thus, we recommend targeting proper sleep interventions for individuals deeply affected by the pandemic and young individuals from lower-income families. Moreover, despite a decrease in the emotional impact of COVID-19 over time, its potential negative effects on sleep persisted. Therefore, efforts should focus on educating young individuals regarding the health benefits of proper sleep, with an emphasis on integrating this information into the health curricula of secondary schools in the Appalachian region.
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Keywords: COVID-19; Adolescent; Sleep hygiene; Income; Appalachian region.

INTRODUCTION

The coronavirus disease 2019 (COVID-19) pandemic has disrupted people's daily routines worldwide, which has led to concerns regarding sleep hygiene, especially among developing youth. Sleep hygiene refers to habits, practices, and routines that are beneficial for proper and regular sleep.[1] These habits, procedures, and routines include sleep/wake time, sleep environment (lighting, noise, sleeping arrangements, etc.), screen time, bedtime, and routine consistency. Young individuals often look for immediate feedback from their actions; as a result, they may focus on the immediate reward of poor sleep hygiene (staying up late or watching TV in bed). The COVID-19 pandemic has affected young individuals' lifestyles and routines, making it difficult for them to prioritize mental health, education, and daily responsibilities, such as sleep, in such unpredictable times. Young individuals are commonly undereducated regarding the benefits and consequences of good and bad sleep.[2] Moreover, many schools do not offer sleep hygiene education, and interventions directed at youths in schools regarding sleep hygiene are rare.[3] Together, these aspects may make it difficult for young people to identify the costs and benefits of poor sleep hygiene.

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Furthermore, research before the pandemic indicated that adolescents typically did not get enough sleep,[4-7] compared to what they should get—an average of 9 h per night.[4,6,8,9] Adolescence is a period during which young individuals experience dramatic changes in sleep due to the interaction of endogenous circadian rhythms, modern lifestyles, social obligations, and pubertal development.[10,11] Moreover, poor sleep quality and short sleep duration have been linked to a decline in academic performance, motor skills, creativity, attention, memory consolidation, and learning.[12-14] Studies show poor sleep hygiene in adolescents can increase the risk of substance abuse and mental health disorders during adulthood.[15,16] Therefore, it is pertinent to establish sleep routines and good sleep hygiene habits at an early age.

COVID-somnia is a term coined to describe the overwhelming multitude of sleep disturbances caused by the pandemic.[17] These disturbances may be due to the overall pandemic stress, medical side effects of COVID-19, disruption of normal daily routines, and social isolation. One of the most common sleep disturbances reported during the pandemic was delayed sleep-wake phase disorder (DSWPD),[18] a circadian disorder in which a person's sleep is delayed by at least 2 h beyond their usual or desired bedtime.[19] Moreover, its main symptoms are inability to fall asleep at a conventional hour, difficulty waking up, and daytime sleepiness.[20] Studies have suggested potential reasons for this increase in DSWPD. A recent study investigating the link between daytime sleepiness during COVID-19 and smartphone use observed that those who used smartphones in a problematic manner (high usage) reported more daytime sleepiness and higher depression levels.[21] Thus, because youths were forced to spend more time at home because of the pandemic, this could have led to increased time spent behind screens. Further, studies have shown that when students are away from school and spend more time at home (holiday breaks and weekends), they are more likely to have irregular sleep patterns, spend more time on screens, and become less physically active.[22,23]

Family income was a structural predictor of sleep quality.[24] Compared to high-income populations, low-income populations report shorter sleep duration and worse sleep quality.[25] Considering that Appalachia is a low-income region, this finding highlights the importance of seeking further information on how income may relate to sleep hygiene among adolescents in Appalachia. In addition, as sleep hygiene dramatically affects mental health and other health indicators, it is important to understand the potential effects of the COVID-19 pandemic and its related stressors on sleep hygiene among disadvantaged adolescents.

METHODS

This study aimed to assess the potential effects of the COVID-19-related emotional impact on sleep hygiene among early adolescents in rural Appalachia and identify groups that may benefit from special attention to mitigate the adverse effects of the pandemic.

Research questions

Considering the above context, we posed the following research questions:

1) Is the COVID-19-related emotional impact associated with daytime sleepiness over time in early adolescents in West Virginia (WV), considering demographic factors and personal COVID-19-related experiences?

2) Is the COVID-19-related emotional impact associated with the average amount of sleep over time in early adolescents in WV, considering demographic factors and personal COVID-19-related experiences?

Data source

This study included data from an ongoing cohort study titled the Young Mountaineer Health Study (YMHS), wherein middle school students from 20 schools in 5 counties in WV are followed two times per year for three years. The YMHS aims to identify community-level factors and individual behaviors of middle school adolescents with Appalachia that may relate to the onset and progression of alcohol use and other risky behaviors, including inadequate sleep hygiene. Their findings aim to inform adults regarding the importance of creating safe environments for youth to develop, learn, and excel. A specific subsection of this study is focused on the COVID-19 pandemic. A detailed description of the YMHS protocols and procedures was previously reported by Kristjansson et al.[26]

Participants

The baseline sample included all accessible 6th-grade students from 20 middle schools in 5 WV counties (Calhoun, Lincoln, Mercer, Wood, and parts of Kanawha counties) in the fall of 2020. Participation was voluntary and based on verbal consent (WVU-approved IRB protocol #1903499093). This cohort design comprised six waves (two times a year) of data collection (October 2020, April 2021, October 2021, March 2022, October 2022, and March 2023). At the baseline assessment (wave 1), 1,671 students participated in the study (all students were enrolled in each school—statewide virtual curriculum-only students). Of these, 1,348 completed the survey during wave 1, resulting in a response rate of 80.7%. The participating schools represented a range of rural, small-town,

and small-city public schools in the WV. Waves 2 and 3 yielded 1,648 and 1,908 completed surveys, respectively (with response rates of 87% and 83.1%, respectively). Thus, the cohort for all three waves included 2,322 individuals.

Measures

Dependent variables

For the sleep hygiene section of the survey, students answered ten questions from the Patient-Reported Outcomes Measurement Information System (PROMIS) Pediatric Sleep Disturbance and Sleep-Related Impairment tool.[27] Daytime sleepiness during COVID-19 was assessed using 6 questions: 1) I was sleepful during the daytime, 2) I had a hard time getting things done because I was sleepful, 3) I had problems during the day because of poor sleep, 4) I had trouble falling asleep, 5) I fell asleep through the night, and 6) I had trouble sleeping. Possible responses ranging from 1="never" to 5="always" were summed to form a scale ranging from 5 to 30. Questions regarding sleeping throughout the night were reverse-coded to match the directionality of the other questions on the scale. The preliminary analysis of this scale suggested a close to a normal distribution and very good internal consistency (Cronbach's α=0.99). Average hours of sleep on weekday and weekend nights were assessed using the following 4 questions: what time do you usually fall asleep after going to bed at 1) weekdays and 2) weekends? Possible responses ranged from 1="7:00 PM or earlier" to 21="5:00 AM or later." The questions involving wake time included the following: what time do you usually wake up on 1) weekdays and 2) weekends? Possible responses ranged from 1="5:00 AM or earlier" to 15="noon or later." Preliminary assessment of the baseline data suggested a close to a normal distribution and acceptable internal consistency for both measures (Cronbach's α weekday=0.98, Cronbach's α weekend=0.98). This variable was recoded for better interpretation with answers between 0.5 and 7.5 h="less than the recommended average," 8–10 h="recommended average," and 10.5–23.5 h="more than the recommended average."

Independent variable

The COVID-19-related emotional impact was assessed with 5 questions designed for this study, headed by the following statement: how true are the following statements about you because of COVID-19? 1) stressed, 2) lonely, 3) bored, 4) sad, and 5) angry. Possible responses ranged from 1="not true at all" to 5="very true" and were summed to form a scale ranging from 5 to 25 (Skew=0.81, Kurtosis=-0.40, Cronbach's α=0.85). An exploratory factor analysis was conducted to further substantiate this new measure, which indicated a one-factor model (Kaiser-Meyer-Olkin [KMO]=0.84, χ^2=2547.2, p<0.001, all communalities above 3; one factor explains 63% of the variance).

Covariates

Three categorical covariates were considered. Individual experiences of COVID-19 were assessed: "Do you personally 1) know anyone who has been sick with COVID-19, and 2) know someone who died from COVID-19?" Multi-response options for these questions included: me (question 1 only), a parent/caregiver, another family member, a friend, or someone else, which were recoded as yes (regardless of the selected multi-response option) or no. Youth perceived family income status was assessed using the question, "How well off financially do you think your family is in comparison to other families in WV?" Possible responses ranged from 1="much worse off" to 7="much better off." This variable was recoded as a dichotomized control variable for better interpretation with answers between 1 and 4="worse off or similar" and 5–7= "better off."

Statistical analysis

All analyses were conducted using SAS 9.4 (SAS Inc., Cary, NC, USA). Descriptive data were reported using means and standard deviations for continuous variables and frequencies and valid percentages for categorical variables.

Generalized estimating equation (GEE) models were fitted to identify variables related to daytime sleepiness and the average amount of sleep in the sample, with time as an independent variable, the distribution set to normal, and the model link set to identity. The independent variable of interest and confounding variables were tested for an interaction with daytime sleepiness, the average amount of sleep on weekdays and weekend nights, and a variable-by-time interaction for those variables that were time-varying (since the values of the variables may change over time [from wave 1 to wave 3]). Each significant variable in the bivariate analyses (p<0.05) was added back to the models step-by-step, and the quasi-likelihood under the independence model criterion (QIC) values were compared to determine the best-fitting model for each outcome. The final estimates were interpreted as unstandardized beta weights.

The GEE model link for daytime sleepiness was set to identity and the distribution was set to normal in SAS. After adding each significant variable to the model, the best-fit model via QIC included the following variables: 1) COVID-19-related emotional impact, 2) Youth-perceived family income, 3) Knowing someone who has been sick with COVID-19, 4) time×knowing someone who has been sick with COVID-19, and 5) Knowing someone who has died of COVID.

For the average amount of sleep on weekday nights, the GEE model link was set to grouped logistics, and the distribu-

tion was set to multinomial in SAS because the average amount of sleep on weekday nights was recorded into three categories. After adding each significant variable to the model, the best-fit model via QIC included the following variables: 1) COVID-19-related emotional impact, 2) youth-perceived family income, 3) knowing someone who has been sick with COVID-19, 4) time×knowing someone who has been sick with COVID-19, and 5) knowing someone who has died of COVID-19. For the average amount of sleep on weekend nights, the GEE model link was set to grouped logistics, and the distribution was set to multinomial in SAS. After adding each significant variable to the model, the best-fit model via QIC included the following variables: 1) COVID-19-related emotional impact, and 2) Youth-perceived family income. For these models, estimates were exponentiated and interpreted as adjusted odds ratios (ORs).

RESULTS

Descriptive statistics

The descriptive statistics of the participants and study variables for all three waves of data are listed in Table 1. The participants included 44.1% males and 55.9% females in wave 1; 46.7% males and 53.3% females in wave 2; and 47.9% males and 52.1% females in wave 3. For youth perceived family income, the sample was primarily homogenous, with 86.8%–90.8% reporting their families as "similar or better off" compared to other families and the remaining 7.0%–8.1% reporting their families as "worse off" across all three waves. Approximately half of the participants (44.4%–68.8%) reported knowing someone who had been sick with COVID-19, and 9.3%–29.3% reported knowing someone who died from COVID-19 across all three waves. In addition, over half of the participants (49.9%–57.0%) reported getting the recommended average amount of sleep on weekday nights, with 7.8%–14.6% reporting getting more and 28.5%–42.1% reporting less than adequate sleep across all three waves. Furthermore, approximately half of the participants (48.0%–50.0%) reported getting the average recommended amount of sleep on weekend nights, with 23.3%–29.2% reporting more and 21.0%–28.0% reporting less than the recommended amount of sleep across all three waves. Participants reported an average COVID-19-related

Table 1. Descriptive statistics for participants and study variables

	Wave 1 (n=1,348)	Wave 2 (n=1,648)	Wave 3 (n=1,908)
Gender			
Male	594 (44.1)	770 (46.7)	913 (47.9)
Female	754 (55.9)	878 (53.3)	995 (52.1)
Youth perceived family income			
Similar or better off	1,170 (86.8)	1,467 (89.0)	1,733 (90.8)
Worse off	109 (8.1)	129 (7.8)	133 (7.0)
Knows someone who has had COVID-19			
Yes	599 (44.4)	1,005 (61.0)	1,313 (68.8)
No	1,110 (90.7)	643 (39.0)	595 (31.2)
Knows someone who has died from COVID-19			
Yes	114 (9.3)	243 (15.5)	500 (29.3)
No	1,110 (90.7)	1,323 (84.5)	1,204 (70.7)
Average hours of sleep on weekday nights			
More than	186 (14.6)	142 (8.7)	145 (7.8)
Recommended	724 (56.9)	927 (57.0)	932 (49.9)
Less than	362 (28.5)	553 (34.0)	787 (42.1)
Average hours of sleep on weekend nights			
More than	370 (29.2)	378 (23.3)	435 (23.3)
Recommended	629 (49.6)	779 (48.0)	934 (50.0)
Less than	266 (21.0)	454 (28.0)	490 (26.2)
COVID-19-related emotional impact (range 5–25)	11.69±5.97	10.93±6.10	9.86±5.74
Daytime sleepiness (range 5–30)	14.95±4.80	15.37±4.88	15.63±5.10

Values are presented as number (%) or mean±standard deviation. Some group totals are less that 100% due to missing data. COVID-19, coronavirus disease 2019

emotional impact score of 11.69 (standard deviation [SD]=5.97, range 5–25) in wave 1, 10.93 (SD=6.10, range 5–25) in wave 2, and 9.86 (SD=5.74, range 5–25) in wave 3. The average daytime sleepiness score reported by the participants was 14.95 (SD=4.80, range 5–30) for wave 1, 15.37 (SD=4.88, range 5–30) for wave 2, and 15.63 (SD=5.10, range 5–30) for wave 3.

Inferential statistics

Table 2 represents multivariate models associated with daytime sleepiness. The results indicated that for every 1-point increase in COVID-19-related emotional impact, the daytime sleepiness score increased by 0.25 points (p<0.001) while holding all other variables in the model constant. Compared to individuals who perceived their family income to be "similar or better off," those who perceived their family income to be "worse off" had a score of 1.20 units higher for daytime sleepiness (p<0.001). Further, compared to individuals who did not know someone who had died from COVID-19, those who reported knowing someone who had died from COVID-19 were expected to score 0.50 units higher for daytime sleepiness (p=0.005).

Table 3 shows the model for the above- and below-average hours of sleep on weekday nights relative to the average number of hours of sleep on weekday nights. As seen in Table 3, for every 0.05 unit increase in the COVID-19-related emotional impact, participants were 1.05 times as likely to belong to the below-average sleep group. Further, the odds of not getting the recommended average amount of sleep (sleeping both too much and too little) on weekday nights were 1.52 times higher among individuals who perceived their family income to be "worse off" than those who perceived their family income to be "similar or better off." In addition, individuals who reported knowing someone who had been sick with COVID-19 were expected to have a 36% reduction in the odds of

Table 2. GEEs model for daytime sleepiness (n=2,322)

Effect	Estimate	SE	95% CI		p
			LL	UL	
Intercept	11.59	0.25	11.10	12.08	<0.001*
Time	0.47	0.08	0.32	0.63	<0.001*
COVID-19-related emotional impact	0.25	0.01	0.22	0.27	<0.001*
Youth perceived family income					
Worse off vs. Similar or better off	1.20	0.30	0.62	1.80	<0.001*
Knows someone who died from COVID-19					
Yes vs. No	0.50	0.18	0.15	0.86	0.005*

*p<0.05. QIC= 4238.77, The model link was set to identity and distribution was set to normal. GEEs, generalized estimating equations; SE, standard error; CI, confidence interval; LL, lower limit; UL, upper limit; COVID-19, coronavirus disease 2019; QIC, quasi-likelihood under the independence model criterion

Table 3. GEEs multinomial interaction model for below-average, average, and above-average hours of sleep on weekday nights (n=2,322)

Effect	Below recommended average						Above recommended average					
	Estimate	SE	95% CI		OR	p	Estimate	SE	95% CI		OR	p
			LL	UL					LL	UL		
Intercept	-1.88	0.16	-2.20	-1.56	0.15	<0.001*	-1.75	0.26	-2.26	-1.23	0.17	<0.001*
Time	0.40	0.06	0.30	0.51	1.50	<0.001*	-0.28	0.11	-0.49	-0.08	0.76	0.007*
COVID-19-related emotional impact	0.05	0.01	0.03	0.06	1.05	<0.001*	0.01	0.01	-0.02	0.03	1.01	0.554
Youth perceived family income												
Worse off vs. Similar or better off	0.42	0.14	0.15	0.70	1.52	0.003*	0.42	0.21	0.01	0.83	1.52	0.044*
Knows someone who died from COVID-19												
Yes vs. No	0.03	0.10	-0.16	0.22	1.03	0.670	0.47	0.17	0.13	0.81	1.60	0.007*
Knows someone has had COVID-19												
Yes vs. No	-0.44	0.20	-0.84	-0.04	0.64	0.031*	-0.08	0.31	-0.68	0.53	0.92	0.803
Time×yes vs. Time×no	0.23	0.09	0.04	0.40	1.26	0.014*	-0.31	0.15	-0.60	-0.02	0.73	0.037*

*p<0.05. QIC=7260.42, The model link was set to glogit and the distribution was set to multinomial. GEEs, generalized estimating equations; SE, standard error; CI, confidence interval; LL, lower limit; UL, upper limit; OR, odds ratio; COVID-19, coronavirus disease 2019; QIC, quasi-likelihood under the independence model criterion

sleeping less than the recommended amount on weekday nights compared to those who did not know someone who had been sick with COVID-19. However, this relationship was time-dependent. Over time, compared to individuals who did not know someone who had been sick with COVID-19, those who did know someone who had been sick with COVID-19 were expected to be 1.26 times more likely to sleep less than the recommended amount on weekday nights and experience a reduction of 27% in the odds of sleeping more than the recommended amount on weekday nights. Finally, compared to individuals who did not know someone who had died from COVID-19, those who knew someone who had died from COVID-19 were expected to be 1.60 times more likely to sleep more than the recommended amount on weekday nights.

Table 4 represents the model for above- and below-average hours of sleep on weekend nights relative to the average number of hours of sleep on weekend nights. The results indicated that for every 0.04 unit increase in the COVID-19-related emotional impact, participants were 1.04 times as likely to belong to the below-average sleep group. Further, the odds of getting less than the recommended average amount of sleep on weekend nights were 1.52 times higher among individuals who perceived their family income to be "worse off" compared to those who perceived their family income to be "similar or better off."

DISCUSSION

The results of this study show that an increase in COVID-19-related emotional impact scores results in an increased likelihood of participants experiencing daytime sleepiness and receiving less than the recommended average amount of sleep on weekdays and weekends. Individuals who perceived their family income was "worse off" had higher scores of daytime sleepiness compared to those who believed their family income was "similar or better off." Moreover, these individuals tended to sleep either too much or too little on weekdays, which could be problematic. They slept less than the recommended average amount on weekend nights. In addition, knowing someone who died of COVID-19 was associated with increased daytime sleepiness. Finally, knowing someone who had been sick with COVID-19 was associated with a reduction in the odds of sleeping less than the recommended amount on weekday nights, but an increase in the odds of getting too much or too little sleep on weekday nights.

Appropriate sleep is crucial for the health, development, and growth of young adults.[28,29] Thus, poor sleep among young people can lead to poor mental health, diminished academic performance, mood disturbances, an increased risk of injuries, and other adverse health outcomes.[6,30-34] Consequently, our findings emphasize the importance of addressing poor sleep hygiene in youth, particularly in families considered to be "worse off" financially compared to other families, which were more deeply affected by personal COVID-19-related experiences and/or experienced higher levels of COVID-19-related emotional impact. Collectively, COVID-19-related stressors and low socioeconomic status appear to negatively impact sleep hygiene in youth.

However, over time (from wave 1 to wave 3), the COVID-19-related emotional impact decreased, and the average daytime sleepiness score increased. This may provide evidence that the poor sleep habits of young people during the pandemic may have continued even after the emotional impact of the pandemic has diminished.

Strengths and limitations

This study had several limitations. First, although practical precautions were taken to minimize non-response bias, this problem may still have occurred, but it was managed statistically and accounted for during the analysis. Second, during the COVID-19 pandemic, surveys were sometimes administered in schools and during online class hours from students' homes using cameras. As a result, receiving help from the survey administrators may have been difficult for the students re-

Table 4. GEE multinomial model for below-average, average, and above-average hours of sleep on weekend nights (n=2,322)

Effect	Below recommended average						Above recommended average					
	Estimate	SE	95% CI		OR	*p*	Estimate	SE	95% CI		OR	*p*
			LL	UL					LL	UL		
Intercept	-1.38	0.14	-1.64	-1.11	0.25	<0.001*	-0.62	0.14	-0.89	-0.34	0.54	<0.001*
Time	0.12	0.04	0.03	0.21	1.13	0.006*	-0.08	0.05	-0.17	0.01	0.92	0.078*
COVID-19-related emotional impact	0.04	0.01	0.02	0.05	1.04	<0.001*	0.01	0.01	-0.01	0.02	1.01	0.503
Youth perceived family income												
Worse off vs. Similar or better off	0.42	0.14	0.15	0.70	1.52	0.002*	-0.10	0.18	-0.45	0.26	0.90	0.591

*p<0.05. QIC=8523.81, The model link was set to glogit and the distribution was set to multinomial. GEE, generalized estimating equation; SE, standard error; CI, confidence interval; LL, lower limit; UL, upper limit; OR, odds ratio; COVID-19, coronavirus disease 2019; QIC, quasi-likelihood under the independence model criterion

sponding to the survey from their homes. Third, longitudinal cohort studies generally suffer from attrition, which was likely to increase during the pandemic. Fourth, sleep problems and emotional impact were not evaluated in a multifaceted manner but were based on self-reported data. Fifth, there are potential limitations to the precision and subjectivity of the qualitative outcome/covariate measurements of sleep time and family income. Finally, the middle school population may have been unable to recall accurate estimates of their sleeping habits, rendering us unable to rule out the possibility of recall bias.

Despite the limitations, our study had several notable strengths. First, we applied a longitudinal design to an understudied high-risk population with high response rates. Thus, the large sample size of the study likely minimized sampling error.[35] Moreover, the school-based data collection system was pilot-tested by collecting three waves of data annually from 16 middle schools to understand the non-response bias. This provided information for producing reliable estimates for projections involving recruitment, retention, and a timeline for the study. Additionally, this study used self-reported constructs that demonstrated reliability in previous adolescent samples to minimize observer bias. Audio-computer-assisted self-interviews were used to reduce social desirability bias, increase the accuracy of reports, and provide audio and visual enhancements to youth participants to ensure that literacy was not required. Data collection was flexible and was often conducted over several days to decrease the burden on school activities and students. Finally, students with disabilities were allowed additional time to complete the study.

Conclusions

This study investigated the impact of the COVID-19 pandemic on the sleep habits of young individuals in Appalachia, recognizing the negative consequences of poor sleep hygiene on their development. This study sheds light on the sleep habits of Appalachian adolescents during the pandemic by exploring sleep patterns and hygiene over time, influenced by the COVID-19-related emotional impact, family income, and personal experiences. Our findings indicate that the emotional impact of COVID-19 correlates with daytime sleepiness and insufficient sleep among young people. Additionally, adolescents from economically disadvantaged families and those personally affected by COVID-19 tended to experience greater daytime sleepiness and inadequate sleep. Therefore, it is crucial to implement targeted sleep interventions for individuals significantly affected by the pandemic and those from lower-income families to address these issues. Despite the decrease in the emotional impact of COVID-19 over time, its potential effects on sleep quality persist. Therefore, efforts should be focused on educating young individuals about the substantial health benefits of maintaining proper sleep habits. Moreover, it is essential to integrate this vital but currently inadequate information on secondary school health curricula in Appalachia.

Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

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