International Journal of General Medicine

Dovepress
open access to scientific and medical research

Open Access Full Text Article

ORIGINAL RESEARCH

Correlation Between Adolescent Mental Health and Sleep Quality: A Study in Indonesian Rural Areas During the COVID-19 Pandemic

Raisa Mentari Moeis[1,*], Rahmat Budi Kuswiyanto[1], Rodman Tarigan[1], Veranita Pandia[2], Meita Dhamayanti[1,*]

[1]Department of Child Health, Dr. Hasan Sadikin Hospital Bandung, Faculty of Medicine, Universitas Padjadjaran, Bandung, West Java, Indonesia; [2]Department of Psychiatric, Dr. Hasan Sadikin Hospital Bandung, Faculty of Medicine, Universitas Padjadjaran, Bandung, West Java, Indonesia

*These authors contributed equally to this work

Correspondence: Meita Dhamayanti, Department of Child Health - Faculty of Medicine, Universitas Padjadjaran, Jl. Pasteur 38, Bandung, West Java, 40161, Indonesia, Tel/Fax +62 22 2035957, Email meita.dhamayanti@unpad.ac.id

Objective: The study aims to analyze the correlation between sleep quality and adolescent mental health in rural areas during the Coronavirus Disease 2019 (COVID-19) pandemic.

Material and Methods: A cross-sectional study was conducted in Bandung rural area in February 2023. The subjects were adolescents aged 12–15 years who attended high school in Sagaracipta Village. To assess mental health, the Strength and Difficulties Questionnaire (SDQ) was used. Meanwhile, sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI) questionnaire. The questionnaires were distributed and then filled in directly by the participants under close supervision. The relationship between mental problems and sleep quality was analyzed with the Spearman Rank correlation. The confidence range employed was 95%, while $p< 0.05$ was considered statistically significant.

Results: The results showed that at two junior high schools in Sagaracipta Village, 70.6% of the 109 subjects had poor sleep quality. Among the subjects, a significant number exhibited abnormal scores on various subscales. Specifically, 24 subjects (22%) showed abnormalities in the emotional subscales, 18 (16.5%) in conduct, 5 (4.6%) in hyperactivity, 15 (13.8%) in problems with peers, 26 (23.9%) in total difficulty, but there were no abnormal subjects on the pro-social sunscale. Based on the Rank Spearman correlation test, there was a statistically significant correlation between sleep quality and the emotional, behavioral, hyperactivity, and overall difficulties subscales, with coefficients of 0.247; 0.258; 0.22; and 0.310 as well as p-values of 0.010; 0.007; 0.021; and 0.001 respectively.

Conclusion: During the COVID-19 pandemic, there was a correlation between mental health and sleep quality among adolescents in rural area.

Keywords: adolescents, mental health, sleep, rural, Covid-19

Introduction

Adolescence is a critical stage of growth and development spanning from 10 and 19 years of age, between childhood and adulthood.[1] According to the World Health Organization (WHO), one in seven adolescents (14%) has mental health problems. Mental health issues among adolescents may affect maturity, disrupt physical health, and limit the chances of living a natural adult life.[2]

The coronavirus disease 2019 (COVID-19) pandemic was a major source of stress and mental health issues. Although the social constraints which accompanied the pandemic impacted people of all ages, it was more pronounced in adolescents since this period required emotional support and social growth from peers.[3]

Covid-19 survivors experienced multiple stressors and traumatic events, such as having family members become infected and/or die, as well as witnessing the painful symptoms and/or death of other patients.[4] Additionally, the lockdown measures

Received: 8 May 2023
Accepted: 24 July 2023
Published: 29 July 2023

implemented during this period resulted in the closure of schools, confining children and adolescents to their homes for an extended period, as well as limiting students to online lessons. School closure during the pandemic affected several activities, including sleep. Consequently, a large proportion of adolescents and young adults experienced greater flexibility in their sleep schedules. Factors such as later school start times, reduced commute time, and fewer extracurricular activities, allowed for changes in sleep routine. Studies have shown a high prevalence of sleep problems and decreased quality among adolescents. According to a previous study, there was an association between Covid-19 related worries and difficulties in falling asleep, maintaining sleep, and delayed sleep/wake patterns. These sleep disturbances are often accompanied by increased levels of anxiety and depressive symptoms since the beginning of the pandemic.[5] Sleep difficulties may develop as a result of isolation and shielding, which may lead to inactive habits, increased food intake, and weight gain. Additionally, being confined to one's house causes significant lifestyle changes due to the absence of key zeitgebers, which might help one maintain a pattern and sleep/wake cycle. The limitations caused irregular sleep patterns, extended screen time, restricted access to outdoor activities, and fewer peer connections. Stress levels may rise as a result of potential changes in family finances, health issues, and future uncertainties, which may result in sleep problems.[6]

Sleep is one of the most important factors that influence adolescent mental health.[7] According to a previous study, adequate sleep is part of good quality of life.[4] Lack of sleep has been related to several mental health disorders and may affect a person's capacity to control emotions along with a negative impact on daytime activities.[8] One key aspect of sleep that affects emotions is the rapid eye movement (REM) sleep phase. In this phase, activation of the prefrontal hyper limbic and dorsolateral, as well as the prefrontal medial cortex occur, which underscores the importance of sleep in facing emotional events.[9]

Although there have been extensive studies on the correlation between sleep quality and mental health problems during the COVID-19 pandemic, the majority were focused on urban areas. Adolescents in urban areas are more at risk of developing behavioral disorders as well as emotional and mental problems.[10] In rural areas, neighborhoods have a more peaceful atmosphere, making the population less emotional.[10] However, only a small number of studies have examined how well teenagers sleeping in rural regions during the Covid-19 pandemic slept and whether they experienced any mental health issues.

Based on this background, this study's goal is to examine the relationship between sleep quality and mental health in adolescents who were living in rural areas during the COVID-19 pandemic. The study was conducted in the Indonesian village of Sagaracipta, Ciparay, in the Bandung region.

Materials and Methods

Study Design

This study was performed in February 2023, with a cross-sectional design on school-age adolescents in the Sagaracipta village, Bandung region.

Participants

The subjects in this study were aged 12–15 years and the inclusion criteria were adolescents attending high school in Sagaracipta Village. Meanwhile, the exclusion criteria were those with physical disabilities or chronic diseases, taking medications for sleep disorders, smoking, and drinking alcohol.

Data Collection

Data collection was carried out after obtaining authorization from the Ethics Research Committee, Faculty of Medicine, Padjadjaran University with the number 142/UN6.KEP/EC/2023. The review adhered to the values set forth in the Helsinki Declaration. Before starting the study, the participant's informed consent and the approval of their parents or legal guardians were also required. The Pittsburgh Sleep Quality Index (PSQI) and Strength and Difficulty Questionnaire (SDQ) were used to assess sleep quality and investigate mental health, respectively. Both instruments were considered self-reported questionnaires. The PSQI included 19 items that represented seven aspects of sleep, including subjective quality, latency, length, habitual efficiency, disruption, use of medicine, and daytime dysfunction, to evaluate whether the

sleep quality was good (score < 5) or poor (score of >5). According to a previous report, The PSQI-Indonesian version had a Cronbach's alpha of 0.72.[11]

The SDQ questionnaire consisted of 25 questions used to evaluate four sub-scales of difficulty namely emotion, conduct, hyperactivity, and relationships with peers, as well as the pro-social sub-scale of strength. Each response was scored on a 3-point Likert scale (0 for "not true", 1 for "partly true", or 2 for "very true"); the score varied from 0 to 10 for each of the five subscales. The sum of all subscales, with the exception of prosocial behaviors, was used to determine the overall problems score, which ranges from 0 to 40. The overall result was classified as either normal, borderline, or abnormal. A higher score indicated behavioral issues that were more severe. The reliability of the SDQ-Indonesian version questionnaire had a Cronbach's value of 0.773.[12]

According to previous studies, the link between sleep quality and mental health was 0.42. Consequently, it was estimated that the minimal sample size required based on calculation with a 5% level of significance was 59 adolescents. Purposive sampling was used to select the study site, while the subjects were recruited using total sampling.

Data Analysis

To describe sociodemographic factors, mental health issues, and sleep quality, descriptive statistics were used. Frequencies and percentages were used to present the data. The Spearman Rank correlation was used to examine the connection between sleep quality and mental health issues. The confidence range used was 95%, while $p< 0.05$ was assumed statistically significant.

Results

A total of 109 subjects were analyzed in this study with 72 being females (66.1%), the average age was 15 years old, 79 were living with both parents (72.5%), and 106 were attending school from home during the pandemic period (97.2%), as shown in Table 1.

Figure 1 shows that 24, 18, 5, 15, and 26 adolescent subjects had abnormal values on the subscale of emotional, conduct, hyperactivity, problems with peers, and total difficulty with proportions of 22%, 16.5%, 4.6%, 13.8%, and 23.9% respectively. However, based on the results, there were no abnormal subjects on the pro-social subscale.

Table 1 Characteristic of Subject (n = 109)

	Total	%
1. Sex:		
Male	37	33.9
Female	72	66.1
2. Age (year): Mean (SD)	15.1 (SD = 0.79)	
3. Living with:		
Father and Mother	79	72.5
Mother/father	15	13.8
Others	15	13.8
4. Number of children within households:		
<3	42	38.5
≥ 3	67	61.5
5. School from home:		
Yes	106	97.2
No	3	2.8
6. Parents work from home:		
Yes	32	29.4
No	77	70.6
7. Gadget and social media use daily:		
< 4 hours/day	42	38.5
≥ 4 hours/day	67	61.5

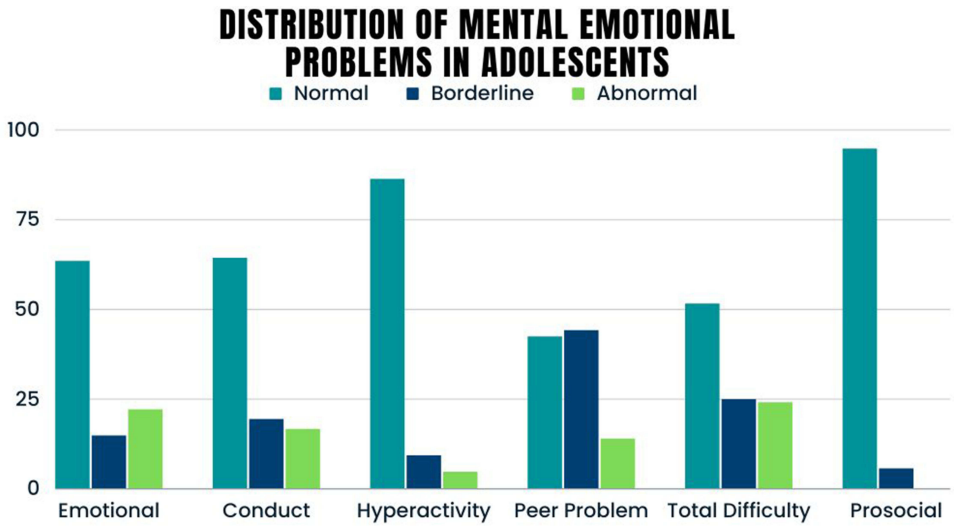

Figure 1 Distribution of mental emotional problems in adolescents.

About 77 subjects (70.6%) had poor sleep quality, while 32 (29.4%) had good quality. The results displayed no significant difference in demographic factors among the study population as shown in Table 2.

Furthermore, the link between sleep quality and mental health among adolescents was analyzed using the Spearman rank correlation. The results showed significant differences ($p<0.05$) between sleep quality and the emotional sub-scale ($r = 0.247$), behavioral ($r = 0.258$), hyperactivity ($r = 0.221$), and total difficulty (r 0.310), with a moderate correlation as depicted in Table 3.

Table 2 Differences in Sleep Quality Based on Demographic Status

Characteristic	Sleep Quality		P value
	Poor n (%)	Good n (%)	
1. Sex:			0.951
Male	26 (70.3%)	11 (29.7%)	
Female	51 (70.8%)	21 (29.2%)	
2. Living with:			0.541
Father and Mother	58 (73.4%)	21 (26.6%)	
Father/Mother	10 (66.7%)	5 (33.3%)	
Others	9 (60.0%)	6 (40.0%)	
3. Number of children within households:			0.667
<3	31 (73.8%)	11 (26.2%)	
≥ 3	46 (68.7%)	21 (31.3%)	
4. School from home:			0.554
Yes	74 (69.8%)	32 (30.2%)	
No	3 (100%)	0 (0%)	
5. Parents work from home:			0.520
Yes	24 (75.0%)	8 (25.0%)	
No	53 (68.8%)	24 (31.2%)	
6. Gadget and social media use daily:			0.113
< 4 hours/ day	26 (61.9%)	16 (38.1%)	
≥ 4 hours/ day	51 (76.1%)	16 (29.4%)	

Table 3 Correlation of Mental Health and Sleep Quality in Adolescents

Mental Emotional Subscale	Sleep Quality		Correlation	
	Poor (n = 77)	Good (n = 32)	Coefficient (r)	p value
1. Emotional:			**0.247**	**0.010**
Abnormal	19 (79.2%)	5 (20.8%)		
Borderline	10 (62.5%)	6 (37.5%)		
Normal	48 (69.6%)	21 (30.4%)		
2. Conduct:			**0.258**	**0.007**
Abnormal	14 (77.8%)	4 (22.2%)		
Borderline	18 (85.7%)	3 (14.3%)		
Normal	45 (64.3%)	25 (35.7%)		
3. Hyperactivity:			**0.221**	**0.021**
Abnormal	5 (100%)	0 (0%)		
Borderline	6 (60.0%)	4 (40.0%)		
Normal	66 (70.2%)	28 (29.8%)		
4. Peer problem:			0.139	0.150
Abnormal	11 (73.3%)	4 (26.7%)		
Borderline	35 (72.9%)	13 (27.1%)		
Normal	31 (67.4%)	15 (32.6%)		
5. Total Difficulty:			**0.310**	**0.001**
Abnormal	23 (88.5%)	3 (11.5%)		
Borderline	17 (63.0%)	10 (37.0%)		
Normal	37 (66.1%)	19 (33.9%)		
6. Prosocial:			−0.045	0.646
Abnormal	0 (0%)	0 (0%)		
Borderline	5 (83.3%)	1 (16.7%)		
Normal	72 (69.9%)	31 (30.1%)		

Note: The bold values was statistically significant (p value <0.05).

Discussion

Adolescence is a time when emotional and mental health issues can arise due to several predisposing factors, including poor sleep quality, lifestyle, environmental influence, and other medical conditions.[13] Furthermore, adolescents exposed to crises, such as the COVID-19 pandemic tend to experience higher stress. According to a previous study conducted in Spain using the SDQ questionnaire, behavioral issues and general difficulties increased during the COVID-19 pandemic.[13] In the United Kingdom, another study reported a rise in mental health problems among adolescents compared to the period before the pandemic.[14]

Several factors are associated with the decrease in sleep quality during the pandemic, like changes in daily activity schedules as well as circadian cycles due to lack of exposure to sunlight, as well as stress.[15] A pre-pandemic study even indicated poor sleep quality among 54% of teens.[16] However, numerous studies have discovered that adolescents' sleep quality improved during the COVID pandemic compared to prior. According to a study conducted in Brazil using the PSQI questionnaire, 68% of the respondents reported having poor sleep quality.[17] The latest results showed that 48% of subjects had poor sleep quality, with 85.6% reporting poor sleep quality based on the PSQI.[18]

Based on the results, 58 adolescents (37%) slept for 5–6 hours, with 20 (13%), 41 (26%), and 37 (24%) sleeping for 5 hours, 6-7 hours, and more than 7 hours respectively. Meanwhile, to perform at their best, teens should get 8 to 10 hours of sleep per night, according to the National Sleep Foundation.[19] This showed that most participants in this study did not fulfill the existing sleep duration recommendations. Teens who get more sleep have better moods and experience fewer signs of depression.[20] In general, shorter sleep durations were associated with worse emotional regulation, while better emotional responses were obtained in children with regular sleep.[21]

The results revealed a link between sleep quality and adolescent mental health problems on the subscales of emotional, conduct, hyperactivity, and total difficulty problems. Emotional problems were found to be related to internal dimensions, such as depression and anxiety, while conduct problems were associated with external aspects, including quarreling with friends, lying, stealing, and other behavioral issues. Hyperactive problems indicated issues with focus, acting before thinking, and not being able to remain silent for a long period. Meanwhile, overall difficulty scores showed disturbances in the respondents' general emotional and mental problems in both internal and external issues.[22] According to reports, sleep problems are linked to emotional and behavioral disorders in children.[23] A Norwegian study discovered a significant association between poor sleep quality and emotional, conduct, hyperactivity, and inattentive problems.[24] Decreased sleep quality was associated with a person's ability to regulate their emotions. Children with good sleep quality were found to have a better mood and control over their emotions compared to those with poor sleep quality.[25] Furthermore, imaging studies in individuals with sleep deprivation reported 60% and three times the activation of the amygdala, indicating a decrease in cognitive control in the emotional area of the brain.[26] Other studies also found that adolescents who lack sleep often take risky actions, regardless of the negative consequences.The influence of this effect can be moderated by the involvement of the striatum, which encompasses the caudate, putamen, and nucleus accumbens. As components of the basal ganglia, these structures play a crucial role in regulating motivation. Behavioral problems such as oppositional and aggressive behavior are often associated with sleep disorders in children. Children of school age who added an average of 30 minutes to their sleep showed improvements in emotional instability and impulsive behavior.[27–29] Sleep disruptions can give rise to symptoms that resemble those of attention deficit hyperactivity disorder (ADHD). This effect was circular, with about 34% of ADHD teenagers having significant sleep difficulties.[30] The study also found a correlation between sleep disorders and hyperactivity in adolescents.

Previous studies discovered that teenagers living in urban areas had more emotional and psychological problems than those in rural areas. Factors such as population density, pollution, lifestyle, and stress all contributed to this disparity.[31] The results of this study showed that the COVID-19 pandemic not only affected the emotional and mental problems of adolescents living in urban areas but also those living in rural areas. A study conducted in Bangladesh found emotional problems among adolescents in rural areas but also highlighted the issue of limited access to mental health services.[32] The prevalence of emotional and mental problems was higher in rural areas, primarily due to the low educational levels of their parents.[33]

Based on the results, there was a decrease in sleep quality associated with the emergence of emotional and mental problems among adolescents living in rural areas during the pandemic. The study had the limitation of not describing the dynamics of mental health among adolescents as well as the quality of their sleep before and during the pandemic. This was because there were no previous data for comparison between the two periods.

Conclusion

There was a correlation between mental health problems and sleep quality among adolescents living in rural areas during the COVID-19 pandemic. Therefore, adequate sleep should be maintained to achieve optimum mental health. Adolescents having emotional and mental issues need further evaluation by health professionals.

As a recommendation, future studies should consider examining adolescents' health problems and sleep quality after the pandemic period.

Acknowledgments

The authors are grateful to the staff of Community Center Yayasan Bumi Walagri An-Namira (Buwana) and Primary Healthcare Centers for their contributions, as well as Ibrahim MD, and DR. Nita Arisanti MD. MPH, for offering statistical expertise, and Undergraduate Community Service Program of the Faculty of Medicine, Universitas Padjadjaran for their efforts as field assistants.

Disclosure

The authors declare that there are no conflicts of interest in this work.

References

1. WHO. Adolescent health in the South-East Asia Region. Available from: https://www.who.int/southeastasia/health-topics/adolescent-health. Accessed July 27, 2023.
2. WHO. Adolescent mental health; 2021. Available from: https://www.who.int/news-room/fact-sheets/detail/adolescent-mental-health. Accessed July 27, 2023.
3. Wiguna T, Anindyajati G, Kaligis F, et al. Brief research report on adolescent mental well-being and school closures during the COVID-19 Pandemic in Indonesia. *Front Psychiatry*. 2020;11:1157.
4. Fu L, Fang Y, Luo D, et al. Pre-hospital, in-hospital and post-hospital factors associated with sleep quality among COVID-19 survivors 6 months after hospital discharge: cross-sectional survey in five cities in China – CORRIGENDUM. *BJPsych Open*. 2021;7(6):76.
5. Ramos Socarras L, Potvin J, Forest G. COVID-19 and sleep patterns in adolescents and young adults. *Sleep Med*. 2021;83:26–33.
6. Bruni O, Malorgio E, Doria M, et al. Changes in sleep patterns and disturbances in children and adolescents in Italy during the Covid-19 outbreak. *Sleep Med*. 2022;91:166–174.
7. Kharel M, Sakamoto JL, Carandang RR, et al. Impact of COVID-19 pandemic lockdown on movement behaviours of children and adolescents: a systematic review. *BMJ Glob Health*. 2022;7(1):e007190.
8. Martin A, Pugmire J, Wells V, et al. Systematic literature review of the relationship between adolescents' screen time, sleep and mental health. *Health Social Care*. 2020:8.
9. Baum KT, Desai A, Field J, Miller LE, Rausch J, Beebe DW. Sleep restriction worsens mood and emotion regulation in adolescents. *J Child Psychol Psychiatry*. 2014;55(2):180–190.
10. Dhamayanti M, Peryoga SU, Firmansyah MR. Emotional mental problems among adolescents: urban and semi-urban settings. *Althea Med J*. 2018;5(2):77–81. doi:10.15850/amj.v5n2.1416
11. Setyowati A, Chung M. Validity and reliability of the Indonesian version of the Pittsburgh Sleep Quality Index in adolescents. *International Journal of Nursing Practice*. 2021;27(5):e12856. doi:10.1111/ijn.12856
12. Oktaviana M, Wimbarti S. Validasi klinik strenghts and difficulties questionnaire (SDQ) sebagai instrumen skrining gangguan tingkah laku. *Jurnal Psikologi*. 2014;41(1):101–114. doi:10.22146/jpsi.6961
13. Ezpeleta L, Navarro JB, de la Osa N, Trepat E, Penelo E. Life conditions during COVID-19 lockdown and mental health in Spanish adolescents. *Int J Environ Res Public Health*. 2020;17(19):7327. doi:10.3390/ijerph17197327
14. Hu Y, Qian Y. COVID-19 and adolescent mental health in the United Kingdom. *J Adolescent Health*. 2021;69(1):26–32.
15. Lin YN, Liu ZR, Li SQ, et al. Burden of Sleep Disturbance During COVID-19 Pandemic: a Systematic Review. *Nat Sci Sleep*. 2021;13:933–966. doi:10.2147/NSS.S312037
16. Dhamayanti M, Faisal F, Maghfirah EC. Hubungan Kualitas Tidur Dan Masalah Mental Emosional Pada Remaja Sekolah Menengah. *Sari Pediatri*. 2019;20(5):283–288. doi:10.14238/sp20.5.2019.283-8
17. da Silva BBL, de Melo MCF, Studart-Pereira LM, Silva BBLD, Melo MCFD. Adolescents' sleep quality during the COVID-19 pandemic. *Sleep Science*. 2022;15(Spec 1):257. doi:10.5935/1984-0063.20220025
18. Mandelkorn U, Genzer S, Choshen-Hillel S, Reiter J. Escalation of sleep disturbances amid the COVID-19 pandemic: a cross-sectional international study. *J Clin Sleep Med*. 2021;17(1):45–53. doi:10.5664/jcsm.8800
19. Hirshkowitz M, Whiton K, Albert SM, et al. National Sleep Foundation's updated sleep duration recommendations. *Sleep Health*. 2015;1(4):233–243.
20. Kortesoja L, Vainikainen M-P, Hotulainen R, et al. Bidirectional relationship of sleep with emotional and behavioral difficulties: a five-year follow-up of Finnish adolescents. *J Youth Adolesc*. 2020;49(6):1277–1291.
21. Chaput J-P, Gray CE, Poitras VJ, et al. Systematic review of the relationships between sleep duration and health indicators in the early years (0–4 years). *BMC Public Health*. 2017;17(5):91–107.
22. Hall CL, Guo B, Valentine AZ, et al. The validity of the Strengths and Difficulties Questionnaire (SDQ) for children with ADHD symptoms. *PLoS One*. 2019;14(6):e0218518.
23. Hosokawa R, Tomozawa R, Fujimoto M, et al. Association between sleep habits and behavioral problems in early adolescence: a descriptive study. *BMC Psychol*. 2022;10(1):1–11.
24. Hestetun I, Svendsen MV, Oellingrath IM. Sleep problems and mental health among young Norwegian adolescents. *Nord J Psychiatry*. 2018;72(8):578–585.
25. Short MA, Bartel K, Carskadon MA. *Sleep and Mental Health in Children and Adolescents*. Grandner MABT-S, editor:Academic Press: 2019. 435–445.
26. Yoo -S-S, Gujar N, Hu P, Jolesz FA, Walker MP. The human emotional brain without sleep—a prefrontal amygdala disconnect. *Curr Biol*. 2007;17(20):R877–8.
27. Shochat T, Cohen-Zion M, Tzischinsky O. Functional consequences of inadequate sleep in adolescents: a systematic review. *Sleep Med Rev*. 2014;18(1):75–87.
28. Baker AE, Tashjian SM, Goldenberg D, Galván A. Neural activity moderates the association between sleep and risky driving behaviors in adolescence. *Dev Cogn Neurosci*. 2020;43:100790.
29. O'Brien LM, Lucas NH, Felt BT, et al. Aggressive behavior, bullying, snoring, and sleepiness in schoolchildren. *Sleep Med*. 2011;12(7):652–658.
30. Beebe DW. Cognitive, behavioral, and functional consequences of inadequate sleep in children and adolescents. *Pediatric Clinics*. 2011;58(3):649–665.
31. Boraita RJ, Alsina DA, Ibort EG, Torres JMD. Quality of life related to health and habits: differences between adolescents in rural and urban environments. *Anales de Pediatría*. 2022;963:196–202.
32. Rezvi MR, Tonmoy MSB, Khan B. The mental health of adolescents following the COVID-19 pandemic in Bangladesh. *Asian J Psychiatr*. 2022;78:103309.
33. Pandia V, Noviandhari A, Amelia I, Hidayat GH, Fadlyana E, Dhamayanti M. Association of mental health problems and socio-demographic factors among adolescents in Indonesia. *Glob Pediatr Health*. 2021;8:2333794X211042223.