Vol. 29, No. 2, 2025, Pages 26-35

Thi-Qar Medical Journal (TQMJ)

Thi-Qar Medical Journal was established in 2006 and is published by the College of Medicine, University of Thi-Qar, Iraq

ISSN (PRINT): 1992-9218 | ISSN (ONLINE): 3006-4791

www.jmed.utq.edu.iq utjmed@utq.edu.iq

Physiological and Psychological Factors Associated with Sleep Deprivation among High School Students

Parwin Anwar Muhammed[1*], Sanaa Hassan Abdul Sahib[2]

1 MSc, Parwin Anwar Muhammed; Department of Community Health Nursing, College of Nursing, University of Raparin, Rania, Sulaymaniyah, Iraq.

2 PhD, Sanaa Hassan Abdul Sahib; Department of Community Health Nursing, College of Nursing, University of Raparin, Rania, Sulaymaniyah, Iraq,

Corresponding Author Email: pzrwin.331123011@uor.edu.krd

Abstract

Received:29/3/2025
Revised:7/4/2025
Accepted:8/4/2025
DOI:
10.32792/jmed.2025.29.20

Keywords:
Keywords1: Physiological factors
Keywords2 : psychological factors
Keywors 3: sleep deprivation
Keywords4:

How to cite
ParwinAnwarMuhammed[1],Sanaa HassanAbdulSahib[2]. PhysiologicalandPsychologicalFactorsAssociated with Sleep Deprivation among High School Students. Thi-Qar Medical Journal(TQMJ). 2025;Volume(29):26-35.

Sleep deprivation is increasingly common among high school students in grades 10–12 due to academic pressure, social factors, and lifestyle changes. Although adolescents need 8–10 hours of sleep, most do not achieve this. Lack of sleep negatively impacts their physical health (metabolism, immunity) and psychological well-being (mood, thinking ability), and long-term deprivation can lead to depression, anxiety, obesity, and poor academic performance. Understanding these physiological and psychological factors is crucial for improving students' overall health and school outcomes. The objectives of this study are to identify the main sociodemographic characteristics of high school students, to determine the physiological and psychological factors associated with sleep deprivation, and to assess the association between selected sociodemographic characteristics and the identified physiological and psychological factors among the study sample**.** A quantitative cross-sectional study was conducted from November 2024 to May 2025 to assess the prevalence and factors associated with sleep deprivation among high school adolescents in Ranya City. A representative sample was drawn from five randomly selected public schools using stratified random sampling. Data were collected through a constructed questionnaire based on relevant literature and standardized tools, validated by 19 experts, and shown to have a reliability coefficient of r = 0.736. The questionnaire covered sociodemographic information, academic performance, screen time, physical activity, caffeine intake, and sleep patterns. Out of 327 participating students, 229 who reported sleep deprivation were included in the analysis of physiological and psychological factors. Among them, 76.9% sometimes experienced physiological disruptions such as caffeine use, physical discomfort, and hunger before sleep, while 54.6% reported psychological discomfort related to schoolwork, personal matters, and emotional stress. Psychological factors showed significant associations with gender, grade level, parents' occupations, and economic status, whereas physiological factors were not significantly related to any sociodemographic characteristics. The findings show that psychological factors contributing to sleep deprivation are closely tied to gender, grade level, parental employment, and socioeconomic status, while physiological factors are shaped more by individual habits than by background characteristics. Overall, the results highlight the need to prioritize psychological stressors when promoting better sleep health among adolescents.

Introduction

Teenagers' lack of sleep is becoming more widely acknowledged as a serious public health issue because of its detrimental impacts on their emotional, mental, and physical health. Sleep deprivation is most common during adolescence, a time of growth marked by major biological, social, and environmental changes. The condition of not getting enough sleep to meet one's physical and mental needs is known as sleep deprivation.(1). Teenagers should get 8 to 10 hours of sleep every night, according to the American Academy of Sleep Medicine, but many don't, which can have a number of detrimental effects. (2). Both inadequate sleep duration and poor sleep quality are part of this condition, which impedes the best possible health outcomes. Inadequate sleep, both in terms of quantity and quality, is known as sleep deprivation, and it impairs both mental and physical performance. Sleep's effects are most noticeable during adolescence because of how important it is for brain development, emotional control, and general health(3). Cognitive impairments, such as deficiencies in executive functioning, memory, and attention, have been associated with inadequate sleep, and these can have a detrimental impact on day-to-day functioning and academic achievement...(4). Lack of sleep is also linked to a higher propensity for risk-taking behavior, more emotional engagement, and a higher vulnerability to mental health conditions like anxiety and depression.

(5) . Additionally, physiological alterations in metabolic processes brought on by prolonged sleep deprivation can raise the risk of obesity, diabetes, and cardiovascular disease..(6). Numerous studies consistently demonstrate that a significant portion of adolescents do not get the recommended 8 to 10 hours of sleep per night, resulting in alarmingly high rates of sleep deprivation. Insufficient sleep was reported by about 72.7% of American high school students, a trend that is also seen worldwide.. (7). 75% of teenagers report getting too little sleep on school nights, according to a 2022 study that was published in JAMA Pediatrics, underscoring how widespread this issue is. (4). Furthermore, there are differences in the quality of sleep, with older teenagers (ages 15 to 18) and those from lower socioeconomic backgrounds generally having worse sleep quality. .(8). Particularly among teenage girls, sleep deprivation is more common, and this is frequently linked to a higher incidence of mental health issues like anxiety and depression. (9).

A study based on the population These results, which were obtained in 82 nations, also support and show comparable trends around the world. According to a 10-year trend analysis carried out in Brazil, the prevalence of anxiety-related sleep disorders in adolescents increased significantly, from 9.4% in 2006 to 9.6% in 2011 and then sharply to 13.3% by 2016. Similarly, the proportion of Danish teenagers who had trouble sleeping on a daily basis rose from 7.0% to 13.4% between 1991 and 2018. Additionally, a comprehensive worldwide study discovered that 28 of the 33 European countries and regions evaluated had an increasing prevalence of sleep issues among adolescents (84.8%). (10). Adolescent sleep duration and quality are significantly impacted by stress and anxiety, two significant psychological factors that frequently work in tandem: emotional distress exacerbates sleep disorders, and sleep deprivation exacerbates stress and anxiety. Teens who are under a lot of stress—whether from social pressures, family issues, or academic obligations—are more likely to have trouble falling asleep, wake up frequently at night, and have non-restorative sleep. (11). discovered in the Journal of Youth and Adolescence that anxiety and pre-bedtime rumination are strongly linked to delayed sleep onset and reduced sleep efficiency, as documented in reviews of sleep medications. Insomnia and poor sleep quality are closely associated with anxiety disorders, and adolescents with anxiety disorders are more likely to experience sleep disorders than their peers without anxiety disorders. By causing physiological excitation, such as elevated cortisol levels and increased sympathetic nervous system activity, stress and anxiety also interfere with restful sleep, further reducing the quality of sleep. (12). It has been demonstrated that treatments aimed at these psychological aspects, such as mindfulness-based stress reduction (MBSR), cognitive-behavioral therapy for insomnia (CBT-I), and relaxation techniques, lower bedtime arousal and enhance emotional regulation, which improves sleep quality. (13). Adolescent sleep patterns and quality are significantly impacted by mood disorders, which include bipolar disorder and depression. These conditions frequently result in a vicious cycle whereby mood symptoms make

sleep disorders worse, which in turn make mood symptoms worse. Teenagers who suffer from depression frequently report having insomnia, hypersomnia, and non-restorative sleep, which are the primary symptoms of the illness. Frequent night awakenings, early morning awakenings, and delayed sleep onset are all more common in teens with depressive symptoms, and they all have a detrimental impact on emotional and cognitive functioning. (14). The onset and recurrence of depressive episodes in adolescents are also predicted by sleep disturbances. (15).

Methodology and Approaches

2.1. Study design and ethical approval

A quantitative, cross-sectional study was carried out to assess Physiological and Psychological Factors Associated with Sleep Deprivation among High School Students. The study was conducted from September 22, 2024, to the end of April 2025 in high schools in Ranya City. The study targeted students from a representative selection public high schools across Ranya City to ensure adequate coverage of diver's sociodemographic backgrounds. Ethical approval for the study was obtained from the University of Raparin/College of Nursing and the Ranya General Directorate of Health. Additionally, oral consent was obtained from all students. students were assured that their data would remain anonymous and be used solely for research purposes.

2.2. Sampling Technique and Sample Size Determination

The purposive sampling technique was employed to recruit participants who met the inclusion criteria for this study. The inclusion criteria were: students enrolled in high schools in Rania City, and students who provided informed consent to participate in the study. Exclusion criteria included students without sleep disorders as well as those who refused to participate in the study. The sample size was determined by on estimated enrolment statistics in high schools in Rania and guidelines from previous studies examining adolescents sleep patterns and associated factors in similar populations. Ultimately, a total of 229 students were included in the final analysis.

2.3. Validation and Reliability of the instrument and Data analysis

In this study, internal consistency reliability was assessed using Cronbach alpha, calculated through SPSS software version 27. A pilot study involving 14 participants and a 45-item questionnaire yielded an overall Cronbach alpha of 0.736, indicating good reliability. Descriptive statistics, including frequency and percentage, were used to summarize the data, and the Chi-square test was applied to identify significant differences between categorical variables.

Results

Table (1): Socio-demographic feature of High School Students N=327

No	Features	Variables	F	%
1	Age	15-16	72	22.0
		17-18	144	44.0
		19-20	111	33.9
2	Gender	Male	101	30.8
		Female	226	69.1
3	Grade	Grade 10	156	47.7
		Grade 11	77	23.5
		Grade 12	94	28.7
4	Marital status	Single	321	98.1
		Married	6	1.8
5	residential area	Urban	285	87.1
		Suburban	33	10.0

		Rural	9	2.7
6	Living situation	With parents	320	97.8
		With grandparents	1	0.3
		With husband	6	1.8
7	Do you have siblings	Yes	322	98.4
		No	5	1.5
8	How many siblings	Zero	4	1.2
		1-3	183	55.9
		4-6	121	37.1
		7-9	15	4.6
		10-13	4	1.2
9	Do you share a bedroom with someone	Yes	224	68.5
		No	103	31.4
10	Level of education mother	Unable to read and write	109	33.3
		Able to read and write	48	14.8
		Primary school graduate	61	18.5
		Secondary school graduate	65	19.8
		Institute graduate	33	10.0
		College graduate	11	3.3
11	Level of education father	Unable to read and write	43	13.1
		Able to read and write	59	18.0
		Primary school graduate	65	19.8
		Secondary school graduate	71	21.7
		Institute graduate	46	14.0
		College graduate	32	9.7
		Post graduate	11	3.3
12	Occupation status mother	Governmental employee	42	12.8
		Self-job	39	11.9
		Jobless	246	75.2
13	Economic status	Sufficient	264	80.7
		Barely Sufficient	50	15.3
		Insufficient	13	4.0
14	Occupation status father	Governmental employee	182	55.6
		Self-job	134	40.9
		Jobless	11	3.3

F: Frequency, % Percentage

Table (1) illustrates the socio-demographic characteristics of the participants. The majority of respondents, 144 (44.0%), were aged between 17 and 18 years, followed by 111 (33.9%) aged 19-20 years, and 72 (22.0%) aged 15-16 years. Most participants were female—226 (69.1%). Regarding academic level, nearly half of the participants, 156 (47.7%), were enrolled in Grade 10, while 94 (28.7%) were in Grade 12 and 77 (23.5%) in Grade 11. Nearly all participants—321 (98.1%)—were single. A significant proportion (285, or 87.1%) lived in urban areas. Most of the students—8%—lived with their parents. Almost all students, 322 (98.4%), reported having siblings, with more than half, 183 (55.9%), having 1 to 3 siblings. Additionally, 224 (68.5%) shared a bedroom with someone.

Concerning parental education, most mothers were unable to read and write—109 (33.3%), followed by secondary school graduates—65 (19.8%). Among fathers, the largest group consisted of secondary school graduates, 71 (21.7%), followed by primary school graduates, 65 (19.8%). Regarding employment, the majority of mothers, 246 (75.2%), were jobless, whereas most fathers, 182 (55.6%), were government employees. Regarding economic status, most families reported sufficient income, 264 (80.7%).

Table 2: physiological factors among High School Students N=229

NO	Items of physiological factors	Always %	Sometimes %	Never %
1	After 6:00 in the evening, I have drinks with caffeine (e.g., cola, root beer, iced tea, coffee)	115 50.2%	96 41.9%	18 7.9%
2	During the 1 hour before bedtime, I am very active (e.g., playing outside, running, wrestling)	25 10.9%	69 30.1%	135 59.0%
3	During the 1 hour before bedtime, I drink more than 4 glasses of water (or some other liquid)	58 25.3%	93 40.6%	78 34.1%
4	I go to bed with a stomach-ache	40 17.5%	119 52.0%	70 30.6%
5	I go to bed feeling hungry	65 28.4%	108 47.2%	56 24.5%
Total		30 13.1%	176 76.9	23 10.0%

Most participants always consume caffeine-containing drinks after 6:00 in the evening (50.2%). The majority never engage in very active physical activities during the hour before bedtime (59.0%). Most participants sometimes drink more than 4 glasses of water (or other liquids) during the hour before bedtime (40.6%). Over half sometimes go to bed with a stomachache (52.0%) or feeling hungry (47.2%). Overall, the majority sometimes experience physiological factors that may affect their sleep (76.9%).

Table 3: psychological factors among High School Students N=229

NO	Items of Psychological Factors	Yes %	No %
1	Is school work a frequent cause of your discomfort	189 82.5%	40 17.5%
2	Are family issues a frequent cause of your discomfort	95 41.5%	134 58.5%
3	Are friendships a frequent cause of your discomfort?	88 38.4%	141 61.6%
4	Are extracurricular activities a frequent cause of your discomfort?	111 48.5%	118 51.5%
5	Are personal issues a frequent cause of your discomfort?	131 57.2%	98 42.8%
6	do you feel overwhelmed by your responsibilities?	216 94.3%	13 5.7%
7	Do you experience mood swings (e.g., feeling happy one moment and sad or irritable the next) ?	224 97.8%	5 2.2%
Total		125 54.6%	104 45.4%

Table (3) illustrates participants' psychological factors causing discomfort. A large majority of participants reported that schoolwork frequently causes them discomfort (82.5%). Over half also experienced discomfort due to personal issues (57.2%) and extracurricular activities (48.5%). Family issues and friendships were less frequently cited, affecting 41.5% and 38.4% of participants, respectively. Most participants felt overwhelmed by their responsibilities (94.3%) and experienced mood swings such as sudden changes in emotions (97.8%). Overall, more than half of the participants (54.6%) reported experiencing psychological discomfort from one or more of these factors.

Table 4: Associations Between Factors and some of Sociodemographic Variables

Factors	Test result	Age	Gender	Grade	Marital status	Residential area	Living situation	Level of education mother	Level of education father	Occupation status mother	Occupation status father	Economic status
physiological factors	P-value	.778	.275	.473	.633	.441	.874	.400	.101	.298	.577	.275
	Chi-square	1.770	2.583	3.534	.915	3.750	1.226	10.469	18.525	4.900	2.887	7.523
Psychological Factors	P-value	.740	.003	.002	.672	.505	.600	.841	.546	.906	.020	.015
	Chi-square	.692	8.729	7.622	.179	1.367	1.021	2.062	4.981	.197	7.847	10.477

This table shows that age did not have a significant association with either physiological (p = 0.778) or psychological factors (p = 0.740). Gender was significantly associated with psychological factors (p = 0.003), but not with physiological ones (p = 0.275), suggesting that gender plays a more prominent role in psychological health than in physical physiological responses. Grade level showed a significant relationship with psychological factors (p = 0.002), but not with physiological factors (p = 0.473), implying that academic level may affect psychological well-being more than physical responses. Marital status did not show significant associations with either physiological (p = 0.633) or psychological factors (p = 0.672), indicating minimal impact in these areas. Similarly, the residential area showed no significant relationships with physiological (p = 0.441) or psychological (p = 0.505) factors. The living situation also did not yield significant associations with physiological (p = 0.874) or psychological (p = 0.600) factors, suggesting these outcomes are not heavily influenced by whom one lives with.

about parental education, the mother's level of education had no significant association with physiological (p = 0.400) or psychological (p = 0.841) factors. However, while the father's education level was not significantly associated with physiological factors (p = 0.101), it was not significant for psychological factors either (p = 0.546), indicating that neither parent's education level had a strong link to these specific health domains. The mother's job status did not have a strong link to physical (p = 0.298) or mental (p = 0.906) health, but the father's job status was significantly related to mental health (p = 0.020), even though it wasn't related to physical health (p = 0.577), suggesting that the father's job may affect mental well-being. Finally, economic status was significantly associated with psychological factors (p = 0.015) but not with physiological factors (p = 0.275), highlighting the influence of financial conditions on mental well-being more than physical health.

1. Discussion

This study indicated that the largest proportion of participants were aged 17–18 years (44.0%). Female adolescents represented the majority of the sample (69.1%), indicating a higher likelihood of female participation. This pattern may reflect prevailing cultural norms that influence gender participation rates or simply the greater availability of female students during data collection periods (16, 17). Additionally, nearly half of the participants (47.7%) were enrolled in Grade 10, which likely corresponds to the timing of data collection and the accessibility of students in specific educational levels. The residential location data revealed that most participants (87.1%) resided in urban areas; this urban predominance may reflect the centralization of educational institutions and better access to research activities within cities, which is consistent with prior studies indicating that urban residence facilitates participation in school-based research.

A significant majority of adolescents (97.8%) lived with their parents, reflecting the persistence of traditional family structures in this population. This finding aligns with (18) The study reported a high prevalence of adolescents living in intact families across diverse settings. Furthermore, almost all participants (98.4%) reported having siblings, with the majority (55.9%) having between one and three siblings, which is typical of family sizes in many cultural contexts. Bedroom sharing was common, with 68.5% of adolescents sharing a bedroom. This trend likely stems from cultural norms and housing constraints, especially in families with multiple children. Importantly, bedroom sharing may influence adolescents' privacy and sleep quality, factors that are closely linked to their overall well-being and daily functioning (19) demonstrated that improving children's sleeping environments can significantly increase sleep duration and reduce the use of electronic devices at bedtime, thereby highlighting the impact of living arrangements on sleep health. Parental education levels revealed a concerning trend: 33.3% of mothers and 13.1% of fathers were unable to read or write. In contrast, only a small proportion of parents had attained higher education degrees, with 3.3% of mothers and 9.7% of fathers holding college degrees. These findings suggest that many participants come from families where parental educational attainment is limited, which may influence family attitudes toward education, healthy behaviors, and future aspirations. Regarding mothers' occupation, the majority were jobless (75.2%). This high percentage of homemakers likely reflects cultural expectations in the study setting, where mothers often take primary responsibility for child-rearing and household management supported by (20) found that a significant majority of participants (83.9%) were housewives. In contrast, fathers typically serve as the primary earners. The data on fathers' occupation supports this observation, as 55.6% of fathers were employed in government jobs, and 40.9% were self-employed, while only a small proportion (3.3%) were jobless. These findings suggest that fathers in the study population generally hold a stable source of income, which may provide economic stability for the family. However, the relatively small proportion of fathers with higher education degrees may still limit the potential for upward social mobility and access to better employment opportunities.

The majority of participants (76.9%) sometimes experience physiological factors that may influence their sleep. These factors can affect the ability to fall asleep and the overall quality of sleep. More than half of the participants sometimes go to bed with a stomachache (52.0%) or feeling hungry (47.2%). Going to bed with an empty stomach or an upset stomach can make it harder to fall asleep and may lead to poor sleep quality. Studies have shown that eating regular and healthy meals is important for better sleep (21). Half of the participants (50.2%) reported always consuming caffeine-containing drinks after 6:00 in the evening. Caffeine is a stimulant that can keep the brain alert, making it harder to fall asleep. This habit may lead to trouble sleeping and poor sleep quality. Previous research supports this finding, showing that caffeine intake in the evening is linked to sleep problems in adolescents (22).

Most participants (59.0%) reported that they never engage in very active physical activities, such as running or playing games, during the hour before bedtime. Such behaviour is generally a positive habit, as physical activity close to bedtime can increase alertness and make it more difficult to fall asleep. However, staying active during the day is important for excellent sleep overall. Studies suggest that while exercise is beneficial for sleep, it should be avoided too close to bedtime (23).Regarding fluid intake before bed, 40.6% of participants said they sometimes drink more than four glasses of water or other liquids during the hour before bedtime. Drinking excessive fluids at night can lead to waking up to use the bathroom, which interrupts sleep and reduces overall sleep quality (24). Additionally, more than half of the participants sometimes go to bed with a stomach-ache (52.0%) or feeling hungry (47.2%). Going to bed hungry or with an upset stomach can make it harder to fall asleep and may result in poor sleep quality. Research has shown that eating regular and balanced meals is important for better sleep and overall health (21).

his discomfort among participants is significant, as more than half (54.6%) experienced psychological distress due to various factors, highlighting the urgent need for interventions that tackle these mental health challenges to enhance sleep quality and overall well-being. The data reveals that a large majority (82.5%) identified schoolwork as a frequent

source of stress, which is consistent with research showing academic demands significantly impact mental health and sleep quality in students (25). Over half of the participants also experienced discomfort related to personal issues (57.2%) and extracurricular activities (48.5%), highlighting the broad range of stressors that affect psychological well-being (Beiter et al., 2015). Family issues (41.5%) and friendships (38.4%) were less frequently reported but remain important social factors influencing mental health and sleep. Most notably, an overwhelming majority reported feeling overwhelmed by their responsibilities (94.3%) and experiencing mood swings (97.8%), indicating high emotional strain that can disrupt sleep and overall functioning (26).

This study shows participants' perceptions of community environment and cultural factors affecting their sleep. 71.2% of participants acknowledged that one or more community or cultural factors negatively impacted their sleep, underscoring the importance of considering environmental and cultural contexts in sleep health interventions. The majority (58.5%) reported that screen time contributes to their sleep deprivation, which aligns with research demonstrating that exposure to screens before bedtime disrupts circadian rhythms and impairs sleep quality (25). Academic pressure (46.7%) and family expectations (44.5%) were also major reasons for sleep issues, showing that social and cultural stress can affect sleep for teenagers and young adults. Social activities contributed to sleep deprivation for 43.2% of participants, consistent with evidence that late-night social engagement can delay bedtime and reduce sleep duration (27). Religious practices were less frequently identified as a factor (33.2%), but some research suggests that certain spiritual or religious routines may influence sleep patterns either positively or negatively depending on timing and context (28).

Associations Between Physiological and Psychological Factors and Sociodemographic Variables

Gender showed a statistically significant relationship with psychological factors indicating gender-specific psychological challenges. Previous studies support this finding, revealing that females are more prone to emotional disturbances and sleep-related issues compared to males (29) reported that gender significantly predicts pre-sleep arousal and trait hyper arousal in individuals with insomnia, emphasizing the influence of cognitive-emotional factors on sleep quality. Similarly,(30) found that women tend to sleep less and experience more interruptions than men (31) further noted that teenage girls are more likely to use substances and develop psychological issues compared to boys, reinforcing the link between gender and emotional vulnerability and founded that have A strong association was also observed between grade level and psychological factors ($p = 0.002$), suggesting that as students' progress in school, they face increasing emotional and academic pressures. This may be due to heightened expectations and performance demands (32) explained that cognitive-emotional interactions can lead to depressive symptoms in adolescents, especially in response to academic stress. Supporting this,(33) found that high-performing students often experience poorer sleep quality due to extended study hours and late bedtimes. About Father's occupation had a significant association with psychological factors indicating that paternal work status may influence adolescents' mental health, possibly through financial pressures or limited emotional availability(34) emphasized that supportive parenting can help reduce the psychological effects of family stress, which includes sleep disruptions. Economic status was also significantly associated with psychological factors ($p = 0.015$, $\chi^2 = 10.477$), showing that students from lower-income households may be at greater risk of psychological distress (35) similarly found that adolescents from families experiencing economic strain are more likely to exhibit mental health concerns and engage in risky behaviors.

Conclusion

The study's findings show that psychological aspects related with sleep deprivation in teenagers are highly influenced by gender, academic level, parental work position, and general socioeconomic conditions. For example, female teenagers were more likely to report sleep problems, probably due to increased exposure to emotional stress, cultural expectations, and scholastic demands.

Similarly, kids in higher academic grades may face increased workloads and anxiety about their future educational opportunities, which can lead to poor sleep patterns. Furthermore, adolescents from households with unemployed parents or lower socioeconomic level may experience additional stress due to financial uncertainty, restricted access to health care, and insecure home situations, all of which can have a detrimental impact on sleep quality.

Acknowledgment

I gratefully acknowledge the support and guidance of my supervisor, the participation of all respondents, and the encouragement of my family and friends.

REFERENCES

1. Mousavi Z, Troxel WM. Later school start times as a public health intervention to promote sleep health in adolescents. Current Sleep Medicine Reports. 2023;9(3):152-60. DOI:10.1007/s40675-023-00263-8
2. Paruthi S, Brooks LJ, D'Ambrosio C, Hall WA, Kotagal S, Lloyd RM, et al. Recommended Amount of Sleep for Pediatric Populations: A Consensus Statement of the American Academy of Sleep Medicine. J Clin Sleep Med. 2016;12(6):785-6. DOI:10.5664/jcsm.5866
3. Woodfield M, Butler NG, Tsappis M. Impact of sleep and mental health in adolescence: an overview. Curr Opin Pediatr. 2024;36(4):375-81. DOI:10.1097/MOP.0000000000001358
4. Crowley R, Alderman E, Javadi A-H, Tamminen J. A systematic and meta-analytic review of the impact of sleep restriction on memory formation. Neuroscience & Biobehavioral Reviews. 2024:105929. DOI:10.1016/j.neubiorev.2024.105929
5. Sullivan EC, James E, Henderson LM, McCall C, Cairney SA. The influence of emotion regulation strategies and sleep quality on depression and anxiety. Cortex. 2023;166:286-305. DOI:10.1016/j.cortex.2023.06.001
6. Hong S, Lee D-B, Yoon D-W, Yoo S-L, Kim J. The Effect of Sleep Disruption on Cardiometabolic Health. Life. 2025;15(1):60. DOI:10.3390/life15010060
7. Uccella S, Cordani R, Salfi F, Gorgoni M, Scarpelli S, Gemignani A, et al. Sleep deprivation and insomnia in adolescence: implications for mental health. Brain sciences. 2023;13(4):569. DOI:10.3390/brainsci13040569
8. Sosso FAE, Holmes SD, Weinstein AA. Influence of socioeconomic status on objective sleep measurement: A systematic review and meta-analysis of actigraphy studies. Sleep health. 2021;7(4):417-28. DOI:10.1016/j.sleh.2021.05.005
9. Chai R, Bian W-J. Adolescent sleep and its disruption in depression and anxiety. Frontiers in Neuroscience. 2024;18:1479420. DOI:10.3389/fnins.2024.1479420
10. Xu G, Li L, Yi L, Li T, Chai Q, Zhu J. A pooled analysis of temporal trends in the prevalence of anxiety-induced sleep loss among adolescents aged 12-15 years across 29 countries. Front Psychiatry. 2023;14:1259442. DOI:10.3389/fpsyt.2023.1259442
11. Zhang J, Xiang S, Li X, Tang Y, Hu Q. The impact of stress on sleep quality: a mediation analysis based on longitudinal data. Front Psychol. 2024;15:1431234. DOI:10.3389/fpsyg.2024.1431234
12. Kelly RJ, Zeringue MM, El-Sheikh M. Adolescents' sleep and adjustment: Reciprocal effects. Child Dev. 2022;93(2):540-55. DOI:10.1111/cdev.13703
13. Mei Z, Cai C, Luo S, Zhang Y, Lam C, Luo S. The efficacy of cognitive behavioral therapy for insomnia in adolescents: a systematic review and meta-analysis of randomized controlled trials. Front Public Health. 2024;12:1413694. DOI:10.3389/fpubh.2024.1413694
14. Castiglione-Fontanellaz CE, Tarokh L. Sleep and adolescent depression. Clinical and Translational Neuroscience. 2023;8(1):3. DOI:10.3390/ctn8010003
15. Baker FC. Sleep disturbance predicts depression symptoms in early adolescence: initial findings from the adolescent brain cognitive development study. J Adolesc Health. 2022. DOI:10.1016/j.jadohealth.2019.12.005
16. Nasim M, Saade M, AlBuhairan F. Sleep deprivation: prevalence and associated factors among adolescents in Saudi Arabia. Sleep medicine. 2019;53:165-71. DOI:10.1016/j.sleep.2018.08.031
17. Liang M, Guo L, Huo J, Zhou G. Prevalence of sleep disturbances in Chinese adolescents: A systematic review and meta-analysis. Plos one. 2021;16(3):e0247333. DOI:10.1371/journal.pone.0247333
18. Zaborskis A, Kavaliauskienė A, Eriksson C, Dimitrova E, Makari J. Family structure through the adolescent eyes: A comparative study of current status and time trends over three decades of HBSC study. Societies. 2022;12(3):88. DOI:10.3390/soc12030088
19. Mindell JA, Sedmak R, Boyle JT, Butler R, Williamson AA. Sleep well!: A pilot study of an education campaign to improve sleep of socioeconomically disadvantaged children. Journal of clinical sleep medicine. 2016;12(12):1593-9. DOI:10.5664/jcsm.6338
20. Mutz-Dehbalaie I, Scheier M, Jerabek-Klestil S, Brantner C, Windbichler GH, Leitner H, et al. Perinatal mortality and advanced maternal age. Gynecologic and obstetric investigation. 2014;77(1):50-7. DOI:10.1159/000357168
21. Hart CN, Carskadon MA, Considine RV, Fava JL, Lawton J, Raynor HA, et al. Changes in children's sleep duration on food intake, weight, and leptin. Pediatrics. 2013;132(6):e1473-e80. DOI:10.1542/peds.2013-1274

22. Drake C, Roehrs T, Shambroom J, Roth T. Caffeine effects on sleep taken 0, 3, or 6 hours before going to bed. Journal of clinical sleep medicine : JCSM : official publication of the American Academy of Sleep Medicine. 2013;9(11):1195-200. DOI:10.5664/jcsm.3170
23. Kredlow M, Capozzoli M, Hearon B, Calkins A, Otto M. The effects of physical activity on sleep: a meta-analytic review. Journal of behavioral medicine. 2015;38. DOI:10.1007/s10865-015-9617-6
24. Weiss A, Xu F, Storfer-Isser A, Thomas A, Ievers-Landis C, Redline S. The Association of Sleep Duration with Adolescents' Fat and Carbohydrate Consumption. Sleep. 2010;33:1201-9. DOI:10.1093/sleep/33.9.1201
25. Hirshkowitz M, Whiton K, Albert SM, Alessi C, Bruni O, DonCarlos L, et al. National Sleep Foundation's sleep time duration recommendations: methodology and results summary. Sleep health. 2015;1(1):40-3. DOI:10.1016/j.sleh.2014.12.010
26. Alfonsi V, Scarpelli S, D'Atri A, Stella G, De Gennaro L. Later school start time: the impact of sleep on academic performance and health in the adolescent population. International journal of environmental research and public health. 2020;17(7):2574. DOI:10.3390/ijerph17072574
27. Short MA, Weber N, Reynolds C, Coussens S, Carskadon MA. Estimating adolescent sleep need using dose-response modeling. Sleep. 2018;41(4):zsy011. DOI:10.1093/sleep/zsy011
28. Koenig HG. Religion, spirituality, and health: The research and clinical implications. International Scholarly Research Notices. 2012;2012(1):278730. DOI:10.5402/2012/278730
29. Hantsoo L, Khou CS, White CN, Ong JC. Gender and cognitive–emotional factors as predictors of pre-sleep arousal and trait hyperarousal in insomnia. Journal of psychosomatic research. 2013;74(4):283-9. DOI:10.1016/j.jpsychores.2013.01.014
30. Burgard SA, Ailshire JA. Gender and time for sleep among US adults. American sociological review. 2013;78(1):51-69. DOI:10.1177/0003122412472048
31. Bright CL, Sacco P, Kolivoski KM, Stapleton LM, Jun H-J, Morris-Compton D. Gender differences in patterns of substance use and delinquency: A latent transition analysis. Journal of Child & Adolescent Substance Abuse. 2017;26(2):162-73. DOI:10.1080/1067828X.2016.1242100
32. Rudolph KD, Davis MM, Monti JD. Cognition–emotion interaction as a predictor of adolescent depressive symptoms. Developmental psychology. 2017;53(12):2377. DOI:10.1037/dev0000397
33. Dokuka S, Smirnov I. High academic performance is associated with shorter sleep and later bedtimes for young adults. arXiv preprint arXiv:200507806. 2020. *(Note: This is an arXiv identifier, not a standard DOI.)*
34. Tsai KM, Dahl RE, Irwin MR, Bower JE, McCreath H, Seeman TE, et al. The Roles of Parental Support and Family Stress in Adolescent Sleep. Child development. 2018;89(5):1577-88. DOI:10.1111/cdev.12917
35. Menasco MA. Family financial stress and adolescent substance use: An examination of structural and psychosocial factors. In: Economic stress and the family. Emerald Group Publishing Limited; 2012. p. 285-315. DOI:10.1108/S1530-3535(2012)0000007011