Adolescent Screen Time and Sleep Quality: Predictive Factors and Their Effect on Academic Achievement

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Article

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Abstract

Adolescents' increasing screen time has been linked to poor sleep quality, which may in turn affect academic performance. This study aimed to examine screen time patterns among Jordanian adolescents and assess their associations with sleep quality and academic achievement. A descriptive correlational study was conducted among 477 students aged 12–14 years from four randomly selected schools in northern Jordan. Participants completed the validated Questionnaire for Screen Time of Adolescents (QueST) and the Adolescent Sleep–Wake Scale–Short Version (ASWS-S), while academic performance was assessed using GPA from school records. Results showed that average screen time was 9.13 hours per day. Weekend screen time emerged as a significant negative predictor of sleep quality ($\beta = -0.27$, $p = .016$). Gender and school type were also significant predictors. Adolescents with screen devices in their bedrooms and those with chronic medical conditions reported higher screen time. Although total screen time did not significantly predict academic achievement, it showed a moderate negative correlation with sleep quality ($r = -.18$, $p < .01$). These findings suggest that excessive screen use, particularly on weekends, may impair sleep quality among adolescents. Interventions targeting screen habits could help enhance sleep and potentially benefit academic performance.

Keywords: adolescents; screen time; sleep quality; academic achievement; predictive factors; media use

1. Background

Screen time has become a growing concern for adolescents due to the widespread availability of digital media. According to the Centers for Disease Control and Prevention (CDC, 2025), teens using screens for more than four hours daily are significantly more likely to experience poor sleep routines. Screen time includes the use of smartphones, tablets, televisions, video games, and computers, for both educational and entertainment purposes (Canadian Paediatric Society, 2019; Pandya & Lodha, 2021; Khalil et al., 2020).

In the U.S., adolescents aged 12–13 averaged 7.7 hours of screen use daily during the COVID-19 pandemic, which correlated with higher stress and poorer mental health (Nagata et al., 2022). Similarly, in Jordan, 98% of households own a mobile phone (Department of Statistics/Jordan and ICF, 2019), and many students exceed the recommended two hours of daily screen use (Yousuf et al., 2021). A study of Jordanian students found that 26% watched TV for more than two hours, 70% used electronic gadgets, and 32% used handheld devices (Atoum & Rimawi, 2020).

Despite guidelines from organizations such as the American Academy of Pediatrics (2016) and the Canadian Pediatric Society (2019), only 37% of U.S. youth meet the screen time recommendations (Walsh et al., 2018). Globally, increased screen time has been linked to declining adolescent mental health (Throuvala et al., 2021) and higher depression risk (Liu et al., 2016).

 doi:10.20944/preprints202508.1684.v1

Sleep is another area of concern. The American Academy of Sleep Medicine recommends 8–10 hours of sleep for adolescents (Paruthi et al., 2016), yet CDC (2024) data show that 77% of high school students do not meet this recommendation. Poor sleep has been shown to affect brain development, learning, and executive functioning (Mason et al., 2021; Unsworth & Robison, 2020). Adolescents often experience daytime sleepiness and reduced vigilance, particularly when using screens before bed (National Sleep Foundation, 2019; Musshafen et al., 2021).

Factors such as content, timing, and location of screen use impact sleep quality (Lissak, 2018). Blue light exposure disrupts circadian rhythms, increasing the risk of insomnia (Alam et al., 2024; Guindon et al., 2024). Additionally, high recreational screen use has been associated with lower academic performance (Bravo-Sánchez et al., 2021; Kim et al., 2017).

Screen use patterns are influenced by gender, device access, parental monitoring, and socioeconomic status (Scott et al., 2019; Heshmat et al., 2018; Ozturk & Yalçin, 2021). Boys are more likely to play video games, while girls are more likely to use social media. Lack of screen time rules and having screens in bedrooms are associated with higher usage (Langøy et al., 2019; Atoum & Rimawi, 2020; Tripathi & Mishra, 2019).

Despite existing research primarily from Western populations, there is a significant gap in understanding these relationships within the Jordanian context, where mobile phone ownership is remarkably high. While previous Jordanian studies have explored aspects of screen time, none have comprehensively examined how screen time, sleep quality, and academic performance collectively interact, nor have they identified predictive factors within this specific adolescent population. This study fills this critical gap by being one of the first to investigate these complex relationships in Jordanian adolescents, uniquely identifying weekend screen time as the strongest negative predictor of sleep quality and exploring how school type, gender, and bedroom device access also play significant roles. Crucially, while no direct link was found between total screen time and academic performance, our findings indicate a moderate correlation between screen time and poorer sleep, suggesting a critical indirect pathway influencing academic outcomes

2. Theoretical Framework

This study is guided by Bronfenbrenner's Ecological Systems Theory (EST), which posits that human development is an outgrowth of the continually changing interactions between the individual and the surrounding systems (Bronfenbrenner, 1979). The EST perspective provides researchers with a holistic lens to investigate the environmental factors that influence screen time behavior among adolescents, thereby affecting their sleep and academic performance. These layers may include, among others, the microenvironment (family routines, bedroom structure, types of schools available), mesosystem (interaction between home and school), and macroenvironment (societal norms regarding technology usage) (Ragasa et al., 2024). By integrating EST, the study acknowledges that adolescents' media consumption is not only a private behavior but also influenced by factors such as parental control, access to digital gadgets, and cultural norms that shape the appropriation of such media (Paulus et al., 2023). This framework, therefore, provides a means for attaining a comprehensive understanding of the actual development of screen time behaviors and their impacts on adolescent well-being, with the potential to inform ecologically valid school health intervention approaches (Ragasa et al., 2024).

3. Study Questions

1. What is the average screen time on weekdays and weekends?
2. What types of media screens are commonly used by students?
3. What is the relationship between total screen time and academic performance (GPA) among adolescents?
4. How does total screen time correlate with overall sleep quality, as measured by the Adolescent Sleep–Wake Scale (ASWS)?

 doi:10.20944/preprints202508.1684.v1

5. What is the relationship between academic performance (GPA) and sleep quality in adolescents?
6. What factors predict screen time and sleep quality?

4. Methods

4.1. Design, Setting, and Participants

This descriptive correlational study was conducted in public and private schools located in the northern region of Jordan. The target population consisted of 7th and 8th-grade students aged 12 to 14 years. Four schools were selected using simple random sampling: two public and two private institutions. Students diagnosed with developmental delays, chronic medical illnesses that might affect their sleep quality, or those who did not obtain parental consent were excluded.

Sample size calculation was based on the minimum required total and per-group sample size for a two-tailed ANOVA using G*Power. "To detect an effect of η2p (partial eta-squared) = .04 with 80% power in a one-way between-subjects ANOVA (three groups, alpha = .05), G*Power suggests we need 79 participants in each group (N = 237)". Typical effect size in psychology is η2p = .04, which equates to Cohen's d = 0.40. The final sample comprised 477 adolescents

4.2. Procedure

Approval was obtained from the Institutional Review Board (IRB) at the authors' institution (XXX). Approval was also received from the Ministry of Education. Informed written consent was obtained from both the students and their guardians.

Following approvals, school principals were contacted, and researchers visited selected schools. Researchers explained the purpose of the study, its benefits, and the procedures involved. Data collection was conducted in classroom settings, ensuring confidentiality and voluntary participation. Students took approximately 20 to 25 minutes to complete the questionnaires.

4.3. Measures

4.3.1. Demographic Data Sheet

A researcher-developed questionnaire collected data on age, gender, school grade, parental marital status, family income, chronic medical conditions, and presence of screens in bedrooms.

4.3.2. Questionnaire for Screen Time of Adolescents (QueST)

Screen time was assessed using the QueST (Knebel et al., 2021), which measures daily screen use across weekdays and weekends in five domains: (1) study/homework, (2) work/internships, (3) video viewing (e.g., movies, news, sports), (4) video gaming, and (5) social media/chat apps. Participants recorded hours and minutes spent on each activity, or zero if not applicable. Total screen time was calculated using the formula:
(Weekdayvolume×5+Weekendvolume×2)÷7(Weekday volume × 5 + Weekend volume × 2) ÷ 7(Weekdayvolume×5+Weekendvolume×2)÷7.
The QueST has strong content validity, with expert-rated clarity (CVI = 94%) and representativeness (CVI = 98%).

4.3.3. Adolescent Sleep-Wake Scale – Short Version (ASWS-S)

Sleep quality was measured using the 10-item ASWS-S (Essner et al., 2015), covering three subscales: Going to Bed (Items 1–3), Falling Asleep/Reinitiating Sleep (Items 4–8), and Returning to Wakefulness (Items 9–10). Items were rated on a 6-point Likert scale, with seven items reverse-scored (1, 3–8). The recall period was adapted from "past month" to "past week" based on Sufrinko et al. (2015). Subscale and total scores were calculated by averaging relevant items, with higher scores indicating better sleep quality.

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The scale demonstrated good internal consistency (α = .64–.89 in healthy samples; α = .74–.84 in clinical populations). In this study, Cronbach's alpha was .85.

4.3.4. Grade Point Average (GPA)

Students' academic performance was measured using their GPA from the previous academic semester. GPA was confirmed via school records.

4.4. Statistical Analysis

Data were analyzed using IBM SPSS Statistics version 27.0. Descriptive statistics were calculated for demographic variables, screen time, sleep quality, and GPA. Pearson correlation coefficients were used to examine the relationships between screen time, academic performance (as measured by GPA), and sleep quality, including subscales of the Adolescent Sleep–Wake Scale (ASWS). Multiple linear regression analyses identified significant predictors of screen time and sleep quality. Statistical significance was set at $P < .05$.

5. Results

5.1. Participant Characteristics

A total of 477 adolescents participated in the study. The mean age of participants was 13.43 (SD=.49) years, with 48.8% (n=233) being female and 51.2%(n=244) male. More than half (52.4% (n=250)) were enrolled in public schools, while 47.6% (n=227) attended private schools. Most participants (93%, n=447) reported living with both parents. The majority, 36.7% (n = 175), had at least one screen device in their bedrooms. Additionally, 14.3% (n = 68) of students reported having chronic medical conditions. The student's grade point average (GPA) ranges from 55 to 99, with the mean student GPA being 88% (*SD* = 9.14). Demographic data are presented in Table 1.

Table 1. Characteristics of study participants (*N*=477).

Variables	Category	*n*	%
Gender	Male	244	51.2
	Female	233	48.8
School	Public school	250	52.4
	Private School	227	47.6
Parents marital status	married	447	93.7
	divorced or widowed	30	6.3
Father's working status	employed	368	77.1
	no work or retired	109	22.9
Mother's working status	employed	202	42.3
	no work or retired	275	57.7
Fathers' educational level	primary	43	9.0
	secondary	95	19.9
	tertiary	339	71.1
Mothers' educational level	primary	52	10.9
	secondary	119	24.9
	tertiary	306	64.2
Having medical or health problems	Yes	68	14.3
	No	409	85.7
Having the television or other screen media in bedrooms	Yes	175	36.7
	No	302	63.3
Age *		13.43 (0.496)	
GPA *		88.06(9.146)	

 doi:10.20944/preprints202508.1684.v1

Family income*	752.36 (315.088)

Note: Mean (SD)*.

5.2. Screen Media Usage

Among the adolescents surveyed (N = 477), mobile phones emerged as the most widely used media device, reported by 82.0% of participants. Usage was slightly higher among males than among females. Television followed closely, with 81.3% of students indicating regular use, showing no notable gender differences. Tablet use was reported by nearly one-third of participants, with usage levels relatively similar across genders. In contrast, laptops and desktop computers were less commonly used, reported by 25.8% and 18.9% of adolescents, respectively (Table 2).

Table 2. Distribution of the types of media used by students of different genders. .

Types of media	Male (*n*=244)		Female (*n*=233)		Total (*n*=477)	
	n	%	*n*	%	*N*	%
Tablets	77	16.1%	72	15.1%	149	31.2%
TV	194	40.7%	194	40.7%	388	81.3%
Mobile	210	44.0%	181	37.9%	391	82.0%
Laptop	62	13.0%	61	12.8%	123	25.8%
Desktop	46	9.6%	44	9.2%	90	18.9%

Note. Percentages and totals are based on respondents. The dichotomy group tabulated at value 1=yes.

5.3. Screen Time

Table 3 presents descriptive statistics for adolescents' daily screen time (N = 477) across weekdays and weekends, categorized by activity type. On weekdays, adolescents spent the most time watching videos (M = 2.22 hours, SD = 1.42), followed by playing video games (M = 1.57 hours, SD = 1.39) and using social media or chat applications (M = 1.41 hours, SD = 1.22). The least amount of screen time was dedicated to work/internship-related activities (M = 1.01, SD = 1.17).

Table 3. The average time spent on media during the week and on weekends.

Screen Time	M	SD	Min	Max
Weekdays				
Studying	1.89	1.32	0	7
Performing work/internship-related activities	1.01	1.17	0	6
Watching videos	2.22	1.42	0	6
Playing video games	1.57	1.39	0	10
Using social media/ chat applications	1.41	1.22	0	6
Weekends				
Studying	2.04	1.59	0	7
Performing work/internship-related activities	1.37	1.52	0	10
Watching videos	3.52	1.69	0	9
Playing video games	2.72	2.00	0	10
Using social media/ chat applications	2.08	1.70	0	7
Total screen time on weekdays	8.090	2.69	2	21

 doi:10.20944/preprints202508.1684.v1

Total screen time on weekends	11.7233	3.31	3	25
Total screen time	9.1283	2.52	2.29	21.57

Note. Total screen time= [[volume on weekdays * 5 + volume on weekend days * 2] / 7).

On weekends, overall screen time increased across all categories. Watching videos was the most time-consuming activity (M = 3.52, SD = 1.69), followed by playing video games (M = 2.72, SD = 2.00) and using social media/chat (M = 2.08, SD = 1.70). Screen time associated with studying and work also increased slightly on weekends (M = 2.04 and M = 1.37, respectively).

The mean total screen time was 8.09 hours per day on weekdays (SD = 2.69) and 11.72 hours on weekends (SD = 3.31), with an overall average of 9.13 hours per day across the week (SD = 2.52). Total screen time was calculated as a weighted average:

Total screen time=(Weekday time×5)+(Weekend time×2)/7

These findings highlight a marked increase in screen use at weekends, particularly for entertainment-related activities.

5.4. Sleep Quality

Table 4 presents descriptive statistics for the Adolescent Sleep Wake Scale (ASWS) subscale and total score among adolescents (N = 477). The Falling Asleep and Reinitiating Sleep subscale (FA/RS) exhibited the highest mean score (M = 4.20, SD = 1.02), indicating relatively better sleep functioning in this domain. In contrast, the Returning to Wakefulness subscale (RTW) had the lowest mean score (M = 3.55, SD = 1.35), suggesting greater difficulty and variability in morning wakefulness. The Going to Bed subscale (GTB) and the Total Sleep Quality Score (ASWSTOT) yielded mean scores of 3.70 (SD = 1.04) and 3.81 (SD = 0.81), respectively, reflecting moderate sleep quality perceptions in those areas. The reported quartiles (25th, 50th, and 75th percentiles) provide further detail on the score distribution, highlighting variability across individuals' responses.

Table 4. The correlation between screen time and students' academic performance and sleep quality.

Variables	*GPA*	*ASWSTOT*	*GTB*	*FA/RS*	*RTW*
ASWS Total	-.02				
ST Total	.01	-.18**	-.14**	-.16**	-.09*
ST weekdays	-.02	-.15**	-.12**	-.13**	-.07
ST weekends	.07	-.18**	-.13**	-.15**	-.10*

. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed). **Note. Going to Bed Subscale – GTB, Falling Asleep and Reinitiating Sleep Subscale – FA/RS, Returning to Wakefulness Subscale – RTW, ASWS Total Sleep Quality Score - ASWSTOT.

5.5. The Relationship Between Screen Time, Academic Performance (GPA), and Sleep Quality

Table 4 presents Pearson correlation coefficients examining the relationships between screen time, academic performance (as measured by GPA), and sleep quality, including subscales of the Adolescent Sleep–Wake Scale (ASWS). Total screen time was not significantly correlated with GPA ($r = .01$, $p > .05$), indicating no relationship between screen time and academic achievement. However, total screen time showed a significant negative correlation with overall sleep quality ($r = –.18$, $p < .01$), as well as with the GTB (Going to Bed; $r = –.14$, $p < .01$), FA/RS (Falling Asleep and Reinitiating Sleep; $r = –.16$, $p < .01$), and RTW (Returning to Wakefulness; $r = –.09$, $p < .05$) subscales.

Weekday screen time was also significantly negatively associated with sleep quality: ASWS total ($r = –.15$, $p < .01$), GTB ($r = –.12$, $p < .01$), and FA/RS ($r = –.13$, $p < .01$), though it was not significantly associated with GPA ($r = –.02$, $p > .05$). Weekend screen time similarly showed significant negative correlations with ASWS total ($r = –.18$, $p < .01$), GTB ($r = –.13$, $p < .01$), FA/RS ($r = –.15$, $p < .01$), and RTW ($r = –.10$, $p < .05$), while its correlation with GPA was weak and non-significant ($r = .07$, $p > .05$).

 doi:10.20944/preprints202508.1684.v1

5.6. Predictors of Sleep Quality and Screen Time

Table 5 summarizes the results of two multiple linear regression models predicting students' total sleep quality score (ASWSTOT) and total screen time (STTOT). In the first model, which examined predictors of sleep quality, type of school (B = –0.245, t = –3.10, p = .002, 95% CI [–0.400, –0.089]) and gender (B = –0.272, t = –3.62, p < .001, 95% CI [–0.420, –0.124]) were significant negative predictors, indicating lower sleep quality among public school students and females. Weekend screen time was also a significant negative predictor of sleep quality (B = –0.272, t = –2.43, p = .016, 95% CI [–0.056, –0.006]), indicating that increased screen time on weekends is associated with poorer sleep quality. Other predictors, including fathers and mothers' education levels, weekday screen time, screen media in the bedroom, and the presence of medical conditions, were not statistically significant in predicting sleep quality (all p > .05).

Table 5. Factors predicting sleep quality and screen time.

Model	**ASWSTOT***			**95.0% CI**		**STTOT***			**95.0% C I**	
	B	t	p	Lower Bound	Uper Bound	B	t	p	Lower Bound	Lower Bound
Type of School	-.245	-3.098	.002	-.400	-.089	-.498	-2.036	.042	-.979	-.017
Gender	-.272	-3.616	.000	-.420	-.124	-.169	-.719	.472	-.631	.293
Father's education	-.013	-.374	.709	-.083	.056	.154	1.401	.162	-.062	.370
Mother's education	.037	.986	.324	-.036	.110	.094	.810	.418	-.134	.323
Medical conditions	.107	1.023	.307	-.099	.314	-.846	-2.601	.010	-1.485	-.207
Television in bedrooms	.145	1.850	.065	-.009	.299	-.889	-3.688	.000	-1.363	-.415
ST weekdays	-.030	-1.881	.061	-.061	.001					
ST weekends	-.272	-2.427	.016	-.056	-.006					

*Dependent Variable: ASWS Total Sleep Quality Score – ASWSTOT, Screen Time Total - STTOT.

In the second model predicting total screen time (STTOT), type of school (B = –0.498, t = –2.04, p = .042, 95% CI [–0.979, –0.017]), presence of medical conditions (B = –0.846, t = –2.60, p = .010, 95% CI [–1.485, –0.207]), and media devices in the bedroom (B = –0.889, t = –3.69, p < .001, 95% CI [–1.363, –0.415]) were all significant negative predictors. These findings suggest that students attending public schools, those with medical conditions, and those with screen media in their bedrooms report significantly higher screen time. Other variables, including gender and parental education, did not significantly predict screen time (all p > .05).

6. Discussion

This study examined the relationship between screen time, sleep quality, and academic performance among Jordanian adolescents. Results revealed excessive screen use, particularly on weekends, and widespread poor sleep quality. Average screen time exceeded 9 hours on weekdays and 11 hours on weekends, far surpassing the 2-hour daily limit recommended by the American Academy of Pediatrics (2022). Similar global trends have been reported (Nagata et al., 2022; Yousuf et al., 2021), with mobile phones being the most used devices (Atoum & Rimawi, 2020).

 doi:10.20944/preprints202508.1684.v1

Over two-thirds of students scored above the PSQI cutoff, indicating poor sleep quality, a pattern consistent with previous research linking excessive screen use to disrupted sleep (Throuvala et al., 2021; Lissak, 2018). Blue light exposure, late-night usage, and screen-related awakenings likely contributed to circadian rhythm disturbances and reduced sleep duration (Alam et al., 2024).

Gender and school type were significant predictors of sleep quality. Girls reported worse sleep, aligning with prior findings (Barel & Tzischinsky, 2022). Additionally, private school students showed poorer sleep, possibly due to higher academic demands or increased screen access. Notably, weekend screen time emerged as the strongest predictor of poor sleep, reflecting the impact of unstructured, prolonged use during off-school hours (NSF, 2019; CDC, 2024).

Total screen time was significantly associated with screen presence in bedrooms and with chronic health conditions, supporting earlier evidence on environmental and health-related influences on screen habits (Musshafen et al., 2021; Langøy et al., 2019).

Despite expectations, screen time was not significantly linked to academic performance (GPA), possibly due to the multifaceted nature of academic success, which encompasses variables such as motivation, family support, and school quality (Bravo Sánchez et al., 2021; Kim et al., 2017). This finding aligns with other studies among adolescents and university students, which have found no direct association between screen time and GPA (Negi, 2024; Pradeep et al., 2023).

Although this study did not find a direct significant correlation between total screen time and academic performance (GPA), a key insight emerged: total screen time showed a significant negative correlation with overall sleep quality across all ASWS domains. This strong association between screen time and disrupted sleep due to factors like blue light exposure and cognitive arousal is particularly concerning given that sleep quality itself emerged as a stronger predictor of academic success (Negi, 2024; Pradeep et al., 2023). This suggests a crucial indirect pathway where excessive screen time, especially on weekends, compromises sleep hygiene, which in turn negatively impacts academic outcomes. Therefore, while screen time may not directly depress grades, its significant detriment to sleep quality poses a substantial threat to adolescents' learning and cognitive functioning.

Applying Bronfenbrenner's Ecological Systems Theory (1979), these results emphasize that interrelated systems shape adolescents' screen behaviors. Bedroom screen presence and weak parental monitoring reflect microsystem influences; school type reflects mesosystem factors; and societal norms surrounding media use represent macrosystem influences (Paulus et al., 2023; Ragasa et al., 2024). These findings underscore the need for multifaceted strategies that encompass screen use, sleep hygiene, and academic support across various contexts, including home, school, and policy.

7. Strengths

This study offers notable strengths that enhance confidence in its findings. It utilized a robust sample of 477 adolescents from both public and private schools in Jordan, providing comprehensive insight into this under-researched, non-Western population. Methodological rigor was maintained through the use of validated instruments. Screen time was assessed with the Questionnaire for Screen Time of Adolescents (QueST), known for its strong content validity (CVI = 94% clarity, 98% representativeness). Sleep quality was measured using the Adolescent Sleep-Wake Scale – Short Version (ASWS-S), which demonstrated good internal consistency (Cronbach's alpha = .85). Furthermore, academic performance was objectively measured using students' GPA from school records, avoiding reliance on self-report. **Limitations**

Despite these valuable insights, this study has several limitations. Firstly, its cross-sectional design precludes the establishment of causal relationships between screen time, sleep quality, and academic performance. Future research employing longitudinal designs is essential to elucidate these causal pathways. Secondly, reliance on self-report instruments for screen time and sleep quality may introduce recall bias or social desirability bias; objective measures would provide more precise data in subsequent studies. Thirdly, conducting the research in a single governorate in northern Jordan

 doi:10.20944/preprints202508.1684.v1

limits the generalizability of these findings to the broader Jordanian adolescent population. Finally, unmeasured confounders, such as extracurricular activities, diet, or psychosocial stressors, were not accounted for and may have influenced the observed relationships. Nevertheless, this study provides one of the first comprehensive examinations of these complex issues in Jordanian adolescents, offering crucial baseline data and identifying key predictive factors for future, more targeted research and interventions.

8. Conclusions

This study highlights the complex interplay among screen time, sleep quality, and academic performance in Jordanian adolescents, an understudied population where mobile phone ownership is remarkably high. Our findings show that excessive weekend screen use detrimentally impacts sleep quality. While no direct link was found between total screen time and academic performance, sleep quality emerged as a stronger predictor of academic success, suggesting screen time's negative influence on academics is largely mediated through impaired sleep. Key predictors of screen time included bedroom media devices and existing medical conditions.

These results hold important implications for educators, parents, school nurses, and health professionals. Schools should implement media literacy and sleep education curricula. School nurses can identify at-risk students through health assessments and deliver targeted interventions. Parental involvement is essential, including monitoring media use, co-viewing content, and keeping bedrooms screen-free, to foster healthier routines that can indirectly support better academic outcomes. Future research should employ objective measurements and longitudinal designs to further understand causal pathways and inform effective multi-level interventions.

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Ethical Approval Statement: Ethical approval for this study was granted by the Institutional Review Board at Jordan University of Science and Technology (IRB No. 15/149/2022, Research No. 350/2022, dated 13.06.2022). From the Ministry of Education, Jordan (No. 427/2022, dated 31/7/2022). Informed consent was obtained from parents, and assent was obtained from students.

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