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The Relationship Between Smartphone Addiction And Sleep Quality Among Grade XI Students At SMA Negeri 1 Bitung

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Abstract

Smartphone addiction refers to excessive and difficult-to-control smartphone use that may disrupt sleep patterns and sleep quality, particularly among adolescents. This study aimed to determine the relationship between smartphone addiction and sleep quality among eleventh-grade students at SMA Negeri 1 Bitung. This study employed a quantitative approach with a correlational design and involved 82 respondents. Data were collected using the Smartphone Addiction Scale–Short Version (SAS-SV) to assess smartphone addiction and the Pittsburgh Sleep Quality Index (PSQI) to evaluate sleep quality. Data were analyzed using the Spearman correlation test. The results showed that the majority of respondents had a high level of smartphone addiction, accounting for 59 students (72.0%), while 15 students (18.3%) had a moderate level and 8 students (9.8%) had a low level. Regarding sleep quality, 70 students (85.4%) experienced poor sleep quality, while 12 students (14.6%) had good sleep quality. The Spearman correlation test revealed a correlation coefficient of 0.269 with a significance value of 0.015 ($p < 0.05$). These findings indicate a statistically significant, weak, positive correlation between smartphone addiction and sleep quality. Thus, higher smartphone addiction scores were associated with higher PSQI scores, indicating poorer sleep quality. This study highlights the importance of addressing smartphone use among adolescents and promoting healthy sleep habits to support their health and daily activities.

Keywords: Smartphone Addiction, Sleep Quality, Students, Adolescents.

INTRODUCTION

The development of digital technology has made smartphones an essential means of communication, information access, social networking, and entertainment, particularly among adolescents. Data from Statistics Indonesia (Badan Pusat Statistik/BPS) indicate that the percentage of Indonesia's population accessing the internet increased from 69.21% in 2023 to 72.78% in 2024. The Indonesian Internet Service Providers Association (Asosiasi Penyelenggara Jasa Internet Indonesia/APJII) reported that the highest internet penetration rate in 2023 was among individuals aged 13–18 years, reaching 98.20%. In North Sulawesi Province, 99.08% of the population who accessed the internet during the preceding three months used mobile phones to do so (BPS, 2024; BPS, 2025; APJII, 2023).

Excessive and uncontrolled smartphone use may develop into smartphone addiction. This condition is characterized by a persistent urge to use the device, difficulty controlling its use, and a tendency to neglect daily activities. Among adolescents, habits such as accessing social media, watching videos, and playing online games may increase the intensity of smartphone use, including before bedtime (Kwon et al., 2013). Smartphone use at night may delay bedtime, while exposure to blue light emitted by screens has the potential to suppress melatonin production, which plays an important role in regulating the sleep-wake cycle (Lubis et al., 2021).

Sleep quality plays an important role in maintaining physical and mental health, as well as supporting adolescents' concentration and learning activities. Previous studies have identified an association between nighttime smartphone use or smartphone usage intensity and sleep quality (Lubis et al., 2021; Sowwam & Arwati, 2025). The relationship between social media use and sleep quality has also been reported among adolescents and university students (Ningsih & Syafriani, 2024; Rengkuan et al., 2024; Manalu, 2026). Meanwhile,

Sugiono and Rahmawati (2023) found an association between smartphone usage intensity, stress, and sleep quality.

Based on preliminary observations at SMA Negeri 1 Bitung, smartphones have become an integral part of students' daily activities. Although the school implements a prohibition on smartphone use within the school premises, smartphone use outside school hours remains difficult to control, particularly for accessing social media, watching videos, and playing online games at night. Grade XI students were selected because they have not yet entered the final examination preparation period, unlike Grade XII students. Further research specifically examining the relationship between smartphone addiction and sleep quality among Grade XI students at SMA Negeri 1 Bitung is therefore needed.

Accordingly, this study aimed to analyze the relationship between these two variables. The research question was formulated as follows: Is there a relationship between smartphone addiction and sleep quality among Grade XI students at SMA Negeri 1 Bitung?

The null hypothesis (H0) stated that there was no relationship between the two variables, whereas the alternative hypothesis (Ha) stated that there was a relationship between smartphone addiction and sleep quality.

RESEARCH METHODS

This study employed a quantitative research method with a descriptive correlational design and a cross-sectional approach. The cross-sectional approach was selected because this study aimed to determine the relationship between smartphone addiction and sleep quality among Grade XI students at SMA Negeri 1 Bitung through measurements of both variables at a single point in time. The study was conducted at SMA Negeri 1 Bitung, located on Wolter Monginsidi Street, Girian Weru Satu, Girian District, Bitung City, North Sulawesi Province, from March to May 2026. The population consisted of all Grade XI students at SMA Negeri 1 Bitung in the 2025/2026 academic year, distributed across 12 classes, with a total of 443 students. The study sample consisted of 82 students, determined using the Slovin formula with a margin of error of 10%. An additional 10% was included to anticipate potential participant dropout, resulting in a total of 91 students prepared for the study, consisting of 82 primary participants and 9 reserve participants. The sampling technique used was proportionate stratified random sampling, in which participants were randomly selected while considering the proportion of students in each class. The inclusion criteria comprised Grade XI students at SMA Negeri 1 Bitung who actively used smartphones, were willing to participate, and were present during data collection. Meanwhile, the exclusion criteria included students who were absent, did not complete the questionnaire, or withdrew from the study.

Data were collected using questionnaires to obtain information regarding respondents' smartphone addiction and sleep quality. Smartphone addiction was measured using the Smartphone Addiction Scale–Short Version (SAS-SV), developed by Kwon et al. (2013) and adapted by Ramadyan (2017). This instrument consists of 10 items assessed using a five-point Likert scale, with response options ranging from strongly agree, agree, neutral, disagree, to strongly disagree, resulting in a total score ranging from 10 to 50. Meanwhile, sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI), developed by Buysse, which evaluates respondents' sleep quality over the preceding month. The PSQI instrument consists of 19 questions grouped into seven components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. The global PSQI score ranges from 0 to 21, with scores of 0–5 categorized as indicating no sleep quality disturbances and scores of 6–21 categorized as indicating sleep quality disturbances (Smyth, 2012).

After all data had been collected, data processing was carried out through several stages, namely editing, coding, data entry, and cleaning, to ensure data completeness and accuracy before analysis. Data processing and analysis were performed using Microsoft Excel and Statistical Product and Service Solutions (SPSS) software. Data analysis consisted of two stages: univariate and bivariate analyses. Univariate analysis was used to describe respondents' characteristics based on age, sex, and class, as well as the distribution of smartphone addiction levels and sleep quality in terms of frequencies and percentages. Meanwhile, bivariate analysis was conducted to determine the relationship between smartphone addiction and sleep quality using Spearman's Rank correlation test, as the research data were ordinal and not normally distributed. The analytical results were interpreted based on significance values at a 95% confidence level, with a significance threshold of $\alpha = 0.05$. A p-value of less than 0.05 indicated a statistically significant relationship between the two variables, whereas a p-value greater than 0.05 indicated no statistically significant relationship. The correlation coefficient was used to determine the direction and strength of the relationship between smartphone addiction and sleep quality.

RESULTS AND DISCUSSION

The research data were obtained from 82 Grade XI students at SMA Negeri 1 Bitung who met the research criteria and agreed to participate as respondents. The data collected included respondents' characteristics, levels of smartphone addiction, and sleep quality. Subsequently, data analysis was conducted to determine the relationship between smartphone addiction and sleep quality among the students. The research findings are presented through univariate and bivariate analyses as follows:

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Tabel 1. Distribution of Respondents' Characteristics

Characteristics	Category	Frequency	
		n	%
Sex	Male	27	32,9
	Female	55	67,1
	Total	82	100,0
Age	15 years	4	4,9
	16 years	44	53,7
	17 years	32	39,0
	18 years	2	2,4
	Total	82	100,0

In Table 1, the study respondents consisted of 82 students from 12 Grade XI classes at SMA Negeri 1 Bitung. The respondents were predominantly female (67.1%), while the most common age group was 16 years (53.7%).

Tabel 2. Distribution of Smartphone Addiction Levels

Smartphone Addiction	Frequency	
	n	%
Low	8	9,8
Moderate	15	18,3
High	59	72,0
Total	82	100,0

In Table 2, the majority of respondents were classified as having a high level of smartphone addiction (72.0%). This finding indicates that a high tendency toward smartphone use was prevalent among the study participants. Activities such as accessing

social media, watching videos, listening to music, and playing online games may encourage students to continuously use their smartphones in their daily lives (Kwon et al., 2013).

Tabel 3. Distribution of Respondents' Sleep Quality

Sleep Quality	Frequency	
	n	%
Good	12	14,6
Bad	70	85,4
Total	82	100,0

In Table 3, the majority of respondents were categorized as having poor sleep quality (85.4%). This finding indicates that poor sleep quality was prevalent among the study participants. Smartphone use before bedtime may delay sleep onset, while exposure to blue light emitted by screens has the potential to disrupt the regulation of the sleep-wake cycle. A study by Lubis et al. (2021) also reported an association between nighttime smartphone use and sleep quality.

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Tabel 4. Results of the Kolmogorov–Smirnov Normality Test

Variables	Kolmogorov Sminov	Sig	Description
Smartphone Addiction Score	0,168	0,000	Not Normally Distributed
Sleep Quality Score	0,118	0,005	Not Normally Distributed

In Table 4, the Kolmogorov–Smirnov normality test showed that the smartphone addiction scores had a test statistic of 0.168 with a significance value of 0.000, while the sleep quality scores had a test statistic of 0.118 with a significance value of 0.005. Both significance values were lower than $\alpha = 0.05$, indicating that neither variable was normally distributed. Therefore, the relationship between the two variables was analyzed using Spearman's rank correlation test.

Tabel 5. Relationship Between Smartphone Addiction and Sleep Quality

Smartphone Addiction Level	Sleep Quality						p-value	r
	Good		Bad		total			
	n	%	n	%	n	%		
Low	5	62,5%	3	37,5%	8	100%	0,015	0,269
Moderate	1	6,7%	14	93,3%	15	100%		
High	6	10,2%	53	89,8%	59	100%		
total	12	14,6%	70	85,4%	82	100%		

In Table 5, the Spearman's rank correlation test revealed a significance value of 0.015 ($p < 0.05$) and a correlation coefficient of 0.269. These findings indicate a statistically significant relationship between smartphone addiction and sleep quality among Grade XI students at SMA Negeri 1 Bitung, with a weak positive correlation. The positive direction of the relationship indicates that higher smartphone addiction scores are associated with higher PSQI scores, indicating poorer sleep quality.

Excessive smartphone use may lead students to spend more time engaging in various digital activities, including during nighttime and before bedtime. Such habits may contribute to bedtime procrastination, thereby reducing the time that should be allocated for rest. In addition, exposure to screen light at night may interfere with physiological processes involved in the regulation of the sleep cycle, while activities such as using social media,

communicating, and playing online games may increase mental stimulation, making individuals remain awake. These conditions may contribute to poorer sleep quality among adolescents (Lubis et al., 2021).

The findings of this study are consistent with those of Sowwam and Arwati (2025), who found that the intensity of smartphone use was associated with sleep quality among adolescents. Higher levels of smartphone use intensity were associated with poorer sleep quality among respondents. Similarly, Sugiono and Rahmawati (2023) reported an association between smartphone use intensity, stress, and sleep quality among adolescents. These findings support the results of the present study, indicating that excessive and difficult-to-control smartphone use may be associated with sleep quality problems.

Nevertheless, the findings of this study indicate that the strength of the relationship between smartphone addiction and sleep quality is relatively weak. This suggests that sleep quality is not only associated with smartphone use habits but may also be influenced by various other factors, such as the sleep environment, lifestyle, stress levels, and bedtime habits. Smartphone use is one behavioral factor associated with sleep quality, but it is not the sole determinant of an individual's sleep condition. Therefore, the relationship identified in this study indicates an association between the two variables and cannot be used to establish a definitive cause-and-effect relationship.

CONCLUSION

Based on the findings of this study involving 82 Grade XI students at SMA Negeri 1 Bitung, the bivariate analysis revealed a statistically significant relationship between smartphone addiction and sleep quality ($p = 0.015$; $r = 0.269$), with a weak positive correlation. This indicates that higher levels of smartphone addiction are associated with higher sleep quality scores, reflecting poorer sleep conditions. Therefore, smartphone addiction is associated with students' sleep quality. This study has several limitations, as it employed a cross-sectional design, which prevents the establishment of a cause-and-effect relationship. Furthermore, the study was limited to Grade XI students at SMA Negeri 1 Bitung and did not examine other potential factors influencing sleep quality, such as lifestyle, environmental conditions, and stress levels. Data collection using questionnaires also depended on the respondents' honesty and understanding when providing their answers. Future research is recommended to involve a larger number of respondents across a broader range of schools and to consider other factors that may influence sleep quality among adolescents.

REFERENCES

Asosiasi Penyelenggara Jasa Internet Indonesia. (2023). *Survei internet APJII 2023*. APJII.

Badan Pusat Statistik. (2024). *Persentase penduduk usia 5 tahun ke atas yang pernah mengakses internet dalam 3 bulan terakhir menurut provinsi dan media*. https://www.bps.go.id/statistics-table/2/NDA3IzI=/persentase-penduduk-usia-5-tahun-ke-atas-yang-pernah-mengakses-internet-dalam-3-bulan-terakhir-menurut-provinsi-dan-media.html

Badan Pusat Statistik. (2025). *Statistik telekomunikasi Indonesia 2024*. https://www.bps.go.id/id/publication/2025/08/29/beaa2be400eda6ce6c636ef8/statistik-telekomunikasi-indonesia-2024.html

Kwon, M., Kim, D.-J., Cho, H., & Yang, S. (2013). The smartphone addiction scale: Development and validation of a short version for adolescents. *PLOS ONE, 8*(12), e83558. https://doi.org/10.1371/journal.pone.0083558

Lubis, N. F., Hanum, F. J., & Reza, M. (2021). Hubungan penggunaan smartphone pada malam hari terhadap kualitas tidur mahasiswa Program Studi Pendidikan Dokter Fakultas Kedokteran Universitas Andalas. *Jurnal Ilmu Kesehatan Indonesia, 1*(3), 379–385. https://doi.org/10.25077/jikesi.v1i3.78

Manalu, B. P. (2026). Hubungan kecanduan media sosial, kualitas tidur, dan kesehatan mental pada mahasiswa: Pendekatan structural equation modeling. *Jurnal Riset dan Inovasi Ilmu Kesehatan, 1*(1), 1–5. https://ejournal.katersipublisher.com/index.php/JRIIK/article/view/202

Ningsih, A. P., & Syafriani. (2024). Hubungan penggunaan sosial media dengan kualitas tidur dan suasana hati pada remaja. *Jurnal Ners, 8*(2), 1981–1986. https://doi.org/10.31004/jn.v8i2.21339

Ramadyan, H. R. (2017). *Hubungan antara kecemasan sosial dengan smartphone addiction pada remaja awal* [Skripsi, Universitas Airlangga]. Repository Universitas Airlangga. https://repository.unair.ac.id/59746/

Rengkuan, J. A. P., Bawiling, N. S., & Moleong, M. (2024). Hubungan penggunaan media sosial dengan kualitas tidur pada mahasiswa semester 3 Prodi Ilmu Kesehatan Masyarakat. *Jurnal Ilmiah Kesehatan Manado, 3*(3), 58–64. https://doi.org/10.64418/jikma.v3i3.162

Smyth, C. (2012). *The Pittsburgh Sleep Quality Index (PSQI)*. Best Practices in Nursing Care to Older Adults, 6(1). Hartford Institute for Geriatric Nursing, New York University College of Nursing. https://www.psychdb.com/_media/sleep/2-insomnia-disorder/the_pittsburgh_sleep_quality_index_psqi.pdf

Sowwam, M., & Arwati, A. P. D. (2025). Hubungan intensitas penggunaan smartphone dengan kualitas tidur pada remaja di SMA Negeri 1 Sambungmacan. *Intan Husada: Jurnal Ilmiah Keperawatan, 13*(1), 104–113. https://doi.org/10.52236/ih.v13i1.691

Sugiono, & Rahmawati, Y. M. (2023). Smartphone use intensity and stress impact on adolescent sleep quality: A correlation study. *Academia Open, 8*(2). https://doi.org/10.21070/acopen.8.2023.7270