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Exploring the Relationship Between Smartphone Addiction and Sleep Quality in Adolescents

Farisa Nadhira Zahra[1], Mahargyantari Purwani Dewi[2*]
Psikologi, Universitas Gunadarma, Depok, Indonesia

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Corresponding author*:
mahargyantari@staff.gunadarma.ac.id

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Abstract: Adolescence is a critical period of development marked by significant physical, cognitive, and emotional changes. However, with the rise of smartphone use, adolescents face challenges related to their sleep quality. Excessive smartphone use, especially at night, has been linked to disrupted sleep patterns, which can negatively affect their health and well-being. **Objective:** This study aims to explore the relationship between smartphone addiction and sleep quality in adolescents. The primary goal is to understand how smartphone addiction influences sleep duration, sleep disturbances, and overall sleep quality, which is crucial for the health and functioning of adolescents. **Methodology:** A quantitative approach was used in this research, employing two standardized scales: one for measuring sleep quality and another for assessing smartphone addiction. Data were collected from adolescents aged 12 to 20 years who met the inclusion criteria of owning a smartphone, using it for at least five hours daily, and engaging in nighttime smartphone use. Simple regression analysis was used to examine the correlation between smartphone addiction and sleep quality. **Findings:** The results revealed a significant negative correlation between smartphone addiction and sleep quality. Adolescents with higher levels of smartphone addiction exhibited poorer sleep quality, characterized by shorter sleep duration, more frequent awakenings, and reduced feelings of refreshment upon waking. These findings highlight the detrimental impact of excessive smartphone use on adolescent sleep. **Implications:** This research contributes to the understanding of how smartphone addiction affects sleep quality among adolescents. The findings suggest that managing smartphone use could be a vital factor in improving sleep quality, which in turn may enhance overall adolescent health and well-being. This study offers a foundation for future interventions aimed at promoting healthier smartphone usage patterns among adolescents. **Originality:** This study provides new insights into the specific impact of smartphone addiction on sleep quality in adolescents, particularly in the Indonesian context. The research offers a unique perspective compared to previous studies and adds valuable data to the broader field of digital health and adolescent well-being.

Keywords: Smartphone Addiction, Sleep Quality, Adolescents, Sleep Disturbances, Digital Health, Adolescent Health

INTRODUCTION

Adolescence is a critical period in human development, marked by the search for identity and significant changes in physical, cognitive, social, and emotional aspects. This

phase connects childhood with adulthood, characterized by physical maturation and social changes that prepare individuals to become adults (Amriel & Herdiana, 2015). However, with the rise of technology, particularly smartphones, adolescents have become more engaged in late-night activities, such as using social media or playing games, which significantly disrupts their sleep patterns. This issue is crucial to address because poor sleep quality in adolescents can impact their physical and mental health, school performance, and lead to long-term health problems like hypertension and metabolic disorders (Potter & Perry, 2005). Studies have shown that poor sleep caused by excessive smartphone use can lead to serious health risks, such as sudden cardiac arrest and stroke (Health, 2022; Hitekno, n.d.). Thus, research is needed to explore the relationship between smartphone addiction and sleep quality among adolescents, which could inform effective public health interventions.

In addition, the growing dependency on smartphones has led adolescents to spend more time on digital platforms than engaging in face-to-face interactions. This dependency affects their sleep, where many adolescents stay up late to use smartphones, neglecting their health (Daryanto, 2016). According to data from (APJII, 2025) the highest number of internet users in Indonesia is within the age group of 15 to 19 years, a group also highly susceptible to sleep disturbances due to smartphone addiction. Excessive smartphone use is known to negatively affect sleep quality by reducing sleep duration, impairing concentration, and decreasing sleep efficiency (Monika, 2018). Hence, further research is necessary to investigate how smartphone addiction influences sleep quality in adolescents, which could lead to more targeted public health policies.

Previous research has indicated that sleep quality in adolescents is influenced by various factors, including irregular sleep habits and environmental conditions. One of the most significant contributors to poor sleep quality is excessive smartphone use (Monika, 2018; Vitya et al., 2022). Smartphone addiction, defined as psychological dependence on the device, is linked to sleep disturbances, particularly in adolescents who tend to stay up late to engage in online activities (Daneshmandi et al., 2012; Kwon et al., 2013). A study by Vitya conducted in SMPN 6 Purwodadi showed that 92.2% of adolescents experienced smartphone addiction, which was directly related to poor sleep quality (Vitya et al., 2022). According to Kwon, smartphone addiction leads to disruptions in daily life, reduced concentration, and diminished sleep quality (Kwon et al., 2013).

Additionally, research on adolescent sleep has highlighted the impact of psychological factors such as stress and anxiety (Hidayat, 2006). Nashori & Diana explain that irregular sleep disrupts circadian rhythms, which further impacts sleep quality (Nashori & Diana, 2005). Social and cultural factors, such as peer pressure and the role of smartphones in everyday life, also play a significant role in influencing sleep quality (Baert & al., 2015). However, despite the abundance of studies addressing adolescent sleep, there is a gap in research specifically exploring the direct relationship between smartphone addiction and sleep quality in adolescents within the context of social and cultural dynamics in Indonesia. Therefore, this study aims to address this gap by focusing on the impact of smartphone addiction on adolescent sleep quality in Indonesia.

This study aims to analyze the relationship between smartphone addiction and sleep quality among adolescents in Indonesia. Specifically, it will examine how smartphone addiction affects sleep duration, continuity, and satisfaction, as well as identify the social factors contributing to this phenomenon. By understanding these relationships, this research hopes to provide insights for developing more effective strategies and interventions to improve sleep quality in adolescents and reduce the negative health impacts of smartphone addiction.

Based on the identified phenomena, we hypothesize that the higher the level of smartphone addiction among adolescents, the worse their sleep quality will be. This hypothesis assumes that excessive smartphone use, particularly at night, disrupts adolescents' sleep time, reduces sleep quality, and may cause long-term health issues. This study will test the negative relationship between smartphone addiction and sleep quality, considering factors such as sleep duration, frequency of awakenings, and the psychological effects of smartphone addiction.

RESEARCH METHOD

This research focuses on adolescents aged 12 to 20 years who own and use smartphones, particularly those who use smartphones for at least five hours per day and engage with their smartphones at night. The unit of analysis for this study is individual adolescents. These individuals are considered the primary subjects for understanding the relationship between smartphone addiction and sleep quality. Adolescents were selected based on specific criteria to ensure that the study addresses the issues of smartphone addiction and its impact on sleep patterns.

This study employs a quantitative research design, which is suitable for examining the relationship between two variables: smartphone addiction and sleep quality. Quantitative methods allow for statistical analysis of the data, which provides objective results and helps quantify the extent of the influence of smartphone addiction on sleep quality. A simple regression analysis was chosen as the primary method to test the hypothesis and measure the strength and direction of the relationship between smartphone addiction and sleep quality. This approach is appropriate for identifying patterns, making predictions, and generalizing findings to a larger adolescent population.

The data for this research were collected from adolescent respondents within the specified age group who meet the inclusion criteria: owning a smartphone, using it at night, and spending at least five hours a day on the device. The main source of information is primary data collected through a survey questionnaire. This questionnaire included standardized scales to measure sleep quality, based on the work of Nashori and Diana, and smartphone addiction, based on the Smartphone Addiction Scale (SAS) developed (Kwon et al., 2013). Secondary data, including relevant literature, were also reviewed to provide a contextual understanding of the research topic.

Data were collected using a structured questionnaire that was distributed to adolescent participants. The questionnaire was designed to assess two primary constructs: sleep quality and smartphone addiction. The sleep quality scale, adapted from Nashori and Diana (Nashori & Diana, 2005), includes items related to soundness of sleep, sleep duration, early sleeping and waking, and the absence of nightmares. The smartphone addiction scale, adapted from Kwon and Kim, includes items related to disruption in daily life, excessive use, social withdrawal, and tolerance (Kwon et al., 2013). The respondents were asked to answer these items based on their typical behaviors and experiences. The data were collected online or through paper-based surveys depending on the accessibility of the participants.

The collected data were analyzed using descriptive statistics and simple regression analysis. Descriptive statistics were used to summarize the demographic characteristics of the sample, as well as the responses to the sleep quality and smartphone addiction scales. Simple regression analysis was employed to test the hypothesis and determine the extent to which smartphone addiction affects sleep quality. This analysis provided insights into the strength and direction of the relationship between the two variables, and allowed for the calculation of the coefficient of determination (R^2) to measure the proportion of

variance in sleep quality explained by smartphone addiction. All statistical analyses were conducted using SPSS software, and the results were interpreted to draw conclusions regarding the impact of smartphone addiction on adolescent sleep quality.

RESULT AND DISCUSSION

The results of the item discrimination test on the sleep quality scale show that all 23 items performed well, with no items found to be problematic. This indicates that all 23 items had satisfactory discrimination power, with item correlation coefficients ranging from 0.52 to 0.78. The results of the item discrimination test for the sleep quality scale are shown in Table 1.

Table 1. Item Distribution on the Sleep Quality Scale

No	Sleep Quality Aspect	Favorable	Unfavorable	Initial Items	Final Items
1	Soundness during sleep	1, 13, 19	3	3	3
2	Adequate sleep time	2, 8, 5, 14, 20	5	5	5
3	Sleeping early and waking early	3, 11, 15, 21	4	4	4
4	Feeling refreshed upon waking	4, 12, 18	6, 9, 16, 22	7	7
5	No bad dreams	7, 10, 17, 23	4	4	4
TOTAL		**23**	**23**		

Meanwhile, the item discrimination test on the smartphone addiction scale revealed that all 33 items were retained, with no items discarded. This means that all 33 items had satisfactory discrimination power, with item correlation coefficients ranging from 0.30 to 0.72. The results of the item discrimination test for the smartphone addiction scale are shown in Table 2.

Table 2. Item Distribution on the Smartphone Addiction Scale

No	Smartphone Addiction Aspect	Favorable Items	Initial Items	Final Items
1	Disruption in daily life	1, 2, 3, 4, 5	5	5
2	Positive anticipation	6, 7, 8, 9, 10, 11, 12, 13	8	8
3	Withdrawal	14, 15, 16, 17, 18, 19	6	6
4	Relationship with virtual world	20, 21, 22, 23, 24, 25, 26	7	7
5	Excessive use	27, 28, 29, 30	4	4
6	Tolerance	31, 32, 33	3	3
TOTAL		**33**	**33**	

The sleep quality scale has a Cronbach's alpha of 0.95, and the smartphone addiction scale has a Cronbach's alpha of 0.93.

Table 3. Reliability Test Results

Scale	Cronbach's Alpha	Number of Items	Description
Sleep Quality	0.95	23	Reliable
Smartphone Addiction	0.93	33	Reliable

Based on the normality test results, the sleep quality scale had a significance value of 0.20, and the smartphone addiction scale also had a significance value of 0.20. These significance values indicate that both scales are normally distributed.

Table 4. Normality Test Results

Scale	Sig.	p	Description
Sleep Quality	0.20	≥0.05	Normal
Smartphone Addiction	0.20	≥0.05	Normal

The linearity test indicated a linear relationship between the sleep quality and smartphone addiction variables, with an F value of 11.685 and a linearity significance value of 0.002 (≤0.05). The deviation from linearity had a significance value of 0.33 (≥0.05), indicating a linear relationship between the two variables.

Table 5. Linearity Test Results

Scale	Sig. Linearity	Sig. Deviation from Linearity	F	Description
Sleep Quality - Smartphone Addiction	0.002	0.33	11.68	Linear

Based on the hypothesis test results, an F value of 10.723 and a significance value of 0.02 ($p \leq 0.05$) were obtained, indicating that there is an effect of smartphone addiction on sleep quality in adolescents. The R square value was 0.113, meaning that smartphone addiction accounts for 11.3% of the variance in sleep quality, while the remaining 88.7% is explained by other variables.

Table 6. Hypothesis Test Results

Variable	F	Sig.	R	R Square	Description
Sleep Quality - Smartphone Addiction	10.72	0.02	0.336	0.113	Significant Influence

This result suggests that the higher the level of smartphone addiction, the stronger the attachment to the smartphone, leading to excessive use and a reduction in sleep duration.

Overuse of smartphones, where individuals cannot control their smartphone usage, negatively affects sleep quality. This is because a lot of time is spent continuously using the smartphone, reducing the amount of time available for sleep. This explanation is also supported by Robby, who found that when individuals stay awake for extended periods at night, the production of the nocturnal hormone melatonin is suppressed, leading to sleep disturbances (Robby et al., 2015). Additionally, when adolescents use smartphones, the brain receives external stimuli such as sound, light, and vibrations from the device, sending signals to the brain that activate the Reticular Activating System (RAS), keeping them awake at night. If this continues for a prolonged period, it can severely disrupt sleep quality in adolescents.

DISCUSSION

The results of this study revealed a significant relationship between smartphone addiction and sleep quality among adolescents. The analysis showed that adolescents with higher levels of smartphone addiction tended to have poorer sleep quality, characterized by shorter sleep duration, more frequent awakenings, and feeling less refreshed upon waking. These findings are consistent with previous studies indicating that excessive smartphone use, particularly late at night, disrupts sleep patterns and negatively affects overall well-being (Monika, 2018; Vitya et al., 2022). The regression analysis further highlighted that smartphone addiction accounts for approximately 11.3% of the variance in sleep quality, suggesting a moderate influence of smartphone addiction on sleep outcomes.

The explanation for these findings can be attributed to several factors related to the use of smartphones. Adolescents, as digital natives, often engage in late-night smartphone use, which exposes them to stimulating content, such as social media, games, and messaging. This exposure, especially to blue light emitted from screens, can interfere with the production of melatonin, a hormone that regulates sleep. As the research by Robby and others indicates, the suppression of melatonin by excessive smartphone use can lead to sleep disturbances and difficulty falling asleep, which in turn reduces sleep quality (Robby et al., 2015). Additionally, the constant mental stimulation from smartphone usage keeps the brain active, preventing the relaxation needed for restful sleep.

When comparing the results of this study with previous research, we find both similarities and differences. For instance, Monika and Kwon also found significant correlations between smartphone addiction and poor sleep quality, supporting the claim

that smartphone use, particularly at night, disrupts sleep (Kwon et al., 2013; Monika, 2018). However, this study expands upon prior work by focusing specifically on adolescents in Indonesia, highlighting the cultural and societal factors that may contribute to smartphone addiction. Unlike earlier studies, this research incorporates a more localized perspective, considering the unique socio-economic and technological contexts that shape adolescent behavior in Indonesia.

The findings of this study carry important implications for understanding the social, psychological, and health-related aspects of smartphone addiction among adolescents. Socially, the pervasive nature of smartphones has altered the way adolescents interact, both with their peers and their families. Instead of engaging in face-to-face conversations, many adolescents prefer virtual interactions, often leading to social withdrawal and loneliness (Kwon et al., 2013). From a psychological standpoint, the addiction to smartphones may serve as a coping mechanism for stress or boredom, further exacerbating sleep disturbances and creating a cycle of dependence. This cycle is particularly concerning as it could lead to more severe health issues, such as anxiety, depression, and other behavioral disorders.

In terms of historical or ideological implications, the increasing dependency on smartphones highlights a shift in how adolescents spend their time, moving away from physical and outdoor activities towards digital engagement. This shift raises concerns about the long-term impact on social skills, physical health, and mental well-being. As technology continues to evolve, the implications of smartphone addiction will need to be reassessed regularly to ensure that future generations can manage their relationship with digital devices in a balanced and healthy way.

The results also reflect both positive and negative consequences. On the positive side, this research contributes valuable insights into the understanding of smartphone addiction as a significant factor affecting adolescent sleep quality. The study highlights the need for more targeted interventions to address smartphone use among young people. On the negative side, the growing addiction to smartphones poses serious risks to adolescent health, particularly in terms of mental well-being and sleep hygiene. The social implications of this addiction are also concerning, as it may contribute to further isolation and disengagement from real-world relationships.

Based on the findings, it is crucial for policymakers, educators, and health professionals to take immediate action. Schools and parents should be more proactive in educating adolescents about the importance of healthy sleep habits and setting boundaries

around smartphone use, especially at night. Policies aimed at limiting screen time for adolescents and promoting alternative activities such as physical exercise, reading, and socializing could help mitigate the adverse effects of smartphone addiction. In addition, mental health professionals should incorporate digital wellness into their treatment plans for adolescents struggling with sleep disorders or anxiety related to excessive smartphone use. By addressing this issue comprehensively, we can help adolescents maintain a healthier relationship with technology, ultimately improving their sleep quality and overall well-being.

CONCLUSION

This study found that smartphone addiction has a significant negative impact on sleep quality among adolescents. The key finding is that higher levels of smartphone addiction are associated with poorer sleep quality, characterized by shorter sleep duration, more frequent awakenings, and a lack of freshness upon waking. These results highlight the importance of addressing smartphone addiction as a critical factor influencing adolescent sleep patterns, which can have broader health implications.

The scientific contribution of this research lies in its provision of new insights into the relationship between smartphone addiction and sleep quality, specifically within the context of adolescents in Indonesia. This study fills a gap in existing literature by combining validated scales for both smartphone addiction and sleep quality to explore the direct influence of smartphone use on sleep among young people. By doing so, it adds valuable data and a new perspective to the ongoing discussions surrounding digital health and adolescent well-being.

However, the study also has limitations. The cross-sectional design limits the ability to infer causality, and the reliance on self-reported data may introduce biases. Future research could benefit from a longitudinal approach and objective measurements of both smartphone use and sleep quality, to further investigate the long-term effects of smartphone addiction. Despite these limitations, the findings offer important contributions and suggest that interventions are needed to help manage smartphone use and improve sleep quality among adolescents.

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