

POOR SLEEP QUALITY DIFFERENCES AMONG ADOLESCENTS WITH SMARTPHONE ADDICTION COMPARED TO ADOLESCENTS WITHOUT SMARTPHONE ADDICTION

Irwina Angelia Silvanasari^{1*}, Hella Meldy Tursina²

^{1,2} Program Studi Ilmu Keperawatan STIKES dr. Soebandi Jember

*Email: irwina.angelia@gmail.com

ABSTRACT

Introduction: An adolescent aggregate is an age group with a high rate of smartphone addiction. Poor sleep quality in adolescents is one of the negative effects resulting from smartphone addiction. **Objective:** To analyse poor sleep quality differences among adolescents with smartphone addiction compared to those without. **Methods:** Analytical observational design with a cross-sectional approach was used in this study, involving 165 secondary school students as the participants. Study variables include smartphone addiction and poor sleep quality. The instruments used for data collection are the Pittsburgh Sleep Quality Index (PSQI) questionnaire and the Smartphone Addiction Scale: Short Version (SAS-SV). The statistical analysis performed was the Mann Whitney test. **Results:** The statistical test results obtained a p-value $< \alpha$ ($0,000 < 0,05$), which means at a 95% confidence level, there was a difference in the poor sleep quality score between adolescents with smartphone addiction compared to those without. Adolescents with smartphone addiction have higher poor sleep quality scores compared to adolescents without smartphone addiction. **Conclusion:** Adolescents should be able to limit the use of the smartphone according to their needs and minimise smartphone use before going to bed at night.

ABSTRAK

Latar belakang: Agregat remaja merupakan salah satu kelompok usia yang memiliki angka kecanduan smartphone yang tinggi. Kualitas tidur yang buruk pada remaja merupakan salah satu dampak negatif dari adanya kecanduan penggunaan smartphone tersebut. **Tujuan:** untuk menganalisis perbedaan skor kualitas tidur yang buruk antara remaja yang kecanduan penggunaan *smartphone* dengan remaja yang tidak kecanduan dalam penggunaan *smartphone*. **Metode:** Desain observasional analitik dengan pendekatan cross sectional digunakan dalam penelitian ini dengan jumlah sampel 165 remaja SMP. Variabel penelitian mencakup kecanduan penggunaan *smartphone* dan kualitas tidur yang buruk. Pengambilan data menggunakan kuesioner *Pittsburgh Sleep Quality Index* (PSQI) dan *Smartphone Addiction Scale: Short Version* (SAS-SV). Uji statistik menggunakan uji Mann Whitney. **Hasil:** Hasil uji statistik didapatkan p value $< \alpha$ ($0,000 < 0,05$) berarti pada tingkat kepercayaan 95% terlihat ada perbedaan skor kualitas tidur yang buruk antara remaja yang kecanduan penggunaan *smartphone* dengan remaja yang tidak kecanduan dalam penggunaan *smartphone*. Remaja yang kecanduan penggunaan *smartphone* memiliki skor kualitas tidur yang buruk lebih tinggi daripada remaja yang tidak kecanduan dalam penggunaan *smartphone*. **Kesimpulan:** Remaja sebaiknya mampu membatasi penggunaan *smartphone* sesuai dengan kebutuhan dan meminimalkan penggunaan *smartphone* saat sebelum tidur di malam hari.

Submission : 14-12-2020

Revised : 05-03-2021

Accepted : 18-03-2021

Kata Kunci : kecanduan penggunaan *smartphone*, kualitas tidur buruk, remaja

Keywords : *smartphone addiction, poor sleep quality, adolescents*

Introduction:

In recent years, there is a massive increase in the use of smartphones not only in developed countries but also in developing countries (Lian et al., 2016). Indonesia, as one of the developing countries, ranked fourth in the world where the population is actively using a smartphone, after China, India, and America (Rahmayani, 2015). An adolescent aggregate is an age group that uses a smartphone on a daily basis. A high number of smartphone addiction was also reported among this age group (Yen et al., 2009).

One of the negative effects of smartphone addiction is poor sleep quality (Demirci et al., 2015). A previous study found that the frequent use of a smartphone is a risk factor for sleeping disorder (Thomé et al., 2011). Moreover, the excessive use of the smartphone has a negative effect on adolescents' sleep patterns, which will also affect their sleep quality (Akçay & Akçay, 2018).

Sleeping is one of the basic human necessity on a daily basis. Fulfilling the need for adequate sleep is directly related to the achievement of better physical, psychological, and cognitive well-being in individuals (Crivello et al., 2019). The necessity of sleep in adolescents is an essential requirement to support learning, memory processes, and achievement in school (Dewald et al., 2010). Consequently, the impact of poor sleep quality in adolescents is potentially associated with poor academic performance at school (Short et al., 2013).

Previous researchers have conducted a preliminary study on ten randomised secondary school adolescents in Jember. The preliminary study found that some adolescents had difficulties falling asleep at night. Also, some adolescents said that they were often sleepy and found it hard to focus on the teachers when participating in learning activities at school. Moreover, most of them also admit that they own a smartphone and frequently use their smartphone before going to sleep.

There is growing evidence related to smartphone addiction and adolescent's sleep quality, but most of the studies only discussed the relations between smartphone addiction and adolescents' sleep quality. A previous study has yet discussed whether adolescents with addiction scored higher poor sleep quality compared to

their peers without addiction. This study aims to analyse the poor sleep quality score differences between adolescents with smartphone addiction compare to those without.

Methods:

This is a quantitative study using analytical observational design with a cross-sectional approach. The researchers measured smartphone addiction and poor sleep quality in adolescents at the same time. This study was conducted on July 2020. This study was conducted at Jenggawah Junior High School, Jember, Jawa Timur Province. The target population of this study was 280 adolescents in the 7th grade of secondary school. A total of 165 participants were recruited in the study, calculated using the Slovin formula ($d=5\%$). A purposive sampling technique was performed as the sampling method. The inclusion criteria are adolescents who own a smartphone, adolescents with poor sleep quality indicated by PSQI score > 5 , and willing to participate in this study. The exclusion criteria are adolescents who were sick at the time of the study.

The instruments in this study include an instrument to measure sleep quality– Pittsburgh Sleep Quality Index (PSQI) (Buysse et al., 1989), and an instrument to measure smartphone addiction– Smartphone Addiction Scale: Short Version (SAS-SV) (Kwon et al., 2013). The SAS-SV instrument consist of 10 statements covering 5 indicators, including daily life disturbances, withdrawals, cyberspace-oriented relationship, overuse, and tolerance. The PSQI instrument consist 7 sleep quality indicators including subjective sleep quality, sleep latency, sleep duration, sleep habits efficiency, sleep disturbances, use of sleeping pills, and disturbances or complaints when awakening.

The data collection process using both instruments was carried out online. The statistical analysis performed was the Mann Whitney test. The research ethics committee form KEPK Stikes dr. Soebandi has approved the current study with approval number 51/SDS/KEPK/TL/VI/2020 on June 2nd, 2020.

Results:

The results of this study consist of both general and specific data, recap on the following tables.

Table 1.
Participants' characteristics distribution: gender

Gender	Frequency	Percentage (%)
Male	80	48,5
female	85	51,5
Total	165	100.0

Table 1 shows that the female accounted for most of the participants, with a total of 85 respondents (51,5%).

Table 2
Participants' characteristics distribution: age and period of smartphone ownership

Characteristics	Mean	SD	Minimum-Maximum
Age (year)	13,52	0,631	12-15
Time of smartphone ownership (years)	2,48	1,603	1-8

Table 2 shows that the participants' age was, on average, 13.52 years with a standard deviation of 0,631. The oldest was 15-year-old, and the youngest was 12-year-old. On average, participants own their smartphone for 2,48 years with a standard deviation of 1,603. The maximum period of owning a smartphone was eight years, and the shortest period of the smartphone ownership was one year.

Table 3
Data identification: smartphone addiction

Smartphone addiction	Frequency	Percentage (%)
Not addicted	53	32,1
Addicted	112	67,9
Total	165	100.0

Table 3 shows that the highest percentage was on the participants who were addicted to smartphones; 112 participants (67,9%).

Table 4
Data identification: poor sleep quality

Dependent Variable	Mean	SD	Minimum-Maximum
Poor sleep quality	6,93	1,156	6-11

Table 4 shows that the mean poor sleep quality score was 6.93, with a standard deviation of 1,156. The highest score was 11, while the lowest was 6.

Table 5.
Bivariate analysis results

	Median (minimum-maximum)	Mean Rank	P-value
Poor sleep quality in adolescents not addicted to smartphone (n=53)	6,00 (6-9)	63,06	0,000
Poor sleep quality n adolescents addicted to smartphone (n=112)	7,00 (6-11)	92,44	

Table 5 shows the results of statistical analysis with a p-value < alpha (0,000 < 0,05), which means at a 95% confidence level, there is a difference in the poor sleep quality score between adolescents who were addicted to smartphones to those who were not.

Discussion:

This study shows that the female participants accounted for 51.5% (n=85) of the participants, a higher percentage than the male. This result is in line with a previous study that stated gender (female) is a risk factor of smartphone addiction (Lee et al., 2017). A significant aspect of smartphone addiction in females was multimedia application, social networking usage, depression, anxiety, and poor sleep quality (Chen et al., 2017). Females have a

higher tendency to use a smartphone than males, hence the higher risk of sleeping disorder (Wang et al., 2019).

The mean age of the participants was 13.52 years. Thirteen years old is categorised as an early adolescent (Hurlock, 2011). A previous study reported that Korean adolescents' mean age with smartphone addiction was 13.28 years (Lee et al., 2017). This may occur due to the finding self-identity phase in early adolescence. Nowadays, smartphone usage tends to be more related to adolescents' social media habits or instant messenger to interact with their peers.

The average period of owning a smartphone was 2.48 years. This result indicates that adolescents own a smartphone since their early adolescence; some even own a smartphone since they were in school-age. Another previous report found 15% of school-age children and 48% of secondary school students own and use smartphones on average an hour a day (Hosokawa & Katsura, 2018). Owning a smartphone before entering adolescence is certainly quite risky because school-age children do not have a mature mindset and cannot judge the good from the bad of their smartphone.

There are 112 adolescents (67.9%) were categorised as adolescents with smartphone addiction. One of smartphone addiction signs is a longer-than-planned screen time (Kwon et al., 2013). A preceding study found that smartphone addiction among adolescents in India may impair their interpersonal skills. Smartphone addiction was also significantly related to adverse health risks and harmful effects on adolescents' psychological aspects (Davey & Davey, 2014).

The mean score of poor sleep quality among participants was 6.93. Poor sleep quality in adolescents may be correlated to poor grades at school (Short et al., 2013). Efforts to improve sleep quality to a good score is therefore necessary. The mean poor sleep quality in adolescents within this study is close to the upper limit of good sleep quality (5). A score of 5 in sleep quality is the score reference in decreasing adolescents' sleep quality score.

The statistical analysis found a difference in sleep quality scores between adolescents with and without smartphone addiction. Adolescents with smartphone addiction scored worse in sleep quality compared to their peers without

smartphone addiction. Adolescents without smartphone addiction also had poor sleep quality, but the score was relatively better than adolescents with smartphone addiction. Smartphone usage in adolescents is generally acceptable; however, other factors may cause them to score poorly in sleep quality. Factors that may affect sleep quality include lifestyle, fatigue, psychological stress, smoking, or illness (Kozier, 2004).

The result of this study adds to findings by preceding studies. An earlier study found that smartphone addiction is positively correlated to sleep quality (high score indicates poor sleep quality) (Liu et al., 2017). Most adolescents who use their smartphone for an hour before sleep or use it on bed suffer from impaired ability to fall asleep (Adams et al., 2013)

The excessive use of smartphones may cause anxiety, which then leads to sleep disorders among adolescents. Adolescents with sleep disorders caused by excessive use of technology are prone to sleepy during the daytime and have difficulties concentrating (Demirci et al., 2015). The use of smartphone exposes the users with bright light. Exposure of electromagnetic fields from a smartphone can also affect the pineal gland, which in turn has an impact on sleep quality. Exposure of electromagnetic fields may also induce changes in cerebral blood flow and electrical activity in the brain. The prolonged smartphone usage can also trigger physical discomfort, like headaches, leading to sleep disorders (Nowreen & Ahad, 2018). Efforts that may help improve sleep quality in adolescents include limiting smartphone usage according to needs. Smartphone usage during sleep time or after getting on the bed should also be minimised to achieve quality sleep.

This research was conducted during the COVID-19 pandemic. This study has limitations related to data retrieval conducted online through google form so that it can not facilitate if there are respondents who do not understand from questionnaire question items.

Conclusion:

This study concludes a significant difference in poor sleep quality between adolescents with and without smartphone addiction. Adolescents with smartphone

addiction scored higher in poor sleep quality than their peers without smartphone addiction. Adolescents should be able to minimise their smartphone usage according to their needs. They should also reduce using a smartphone before sleeping to achieve better sleep quality.

References:

- Adams, S. K., Daly, J. F., & Williford, D. N. (2013). Article Commentary: Adolescent Sleep and Cellular Phone Use: Recent Trends and Implications for Research. *Health Services Insights*, 6, 99–103. <https://doi.org/10.4137/HSI.S11083>
- Akçay, D., & Akçay, B. D. (2018). The influence of media on the sleep quality in adolescents. *Turkish Journal of Pediatrics*, 60(3), 255–263. <https://doi.org/10.24953/turkjped.2018.03.004>
- Buyse, D. J., Reynolds, C. F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). *Buyse DJ, Reynolds CF, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. Psychiatry Res. 1989;28:193–213.*
- Chen, B., Liu, F., Ding, S., Ying, X., Wang, L., & Wen, Y. (2017). Gender differences in factors associated with smartphone addiction: a cross-sectional study among medical college students. *BMC Psychiatry*, 17(341), 1–9. <https://doi.org/10.1186/s12888-017-1503-z>
- Crivello, A., Barsocchi, P., Girolami, M., & Palumbo, F. (2019). The Meaning of Sleep Quality: A Survey of Available Technologies. *IEEE Access*, 7, 167374–167390. <https://doi.org/10.1109/ACCESS.2019.2953835>
- Davey, S., & Davey, A. (2014). Assessment of Smartphone Addiction in Indian Adolescent. *International Journal of Preventive Medicine*, 12, 1500–1511. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4336980/>
- Demirci, K., Akgönül, M., & Akpınar, A. (2015). Relationship of smartphone use severity with sleep quality, depression, and anxiety in university students. *Journal of Behavioral Addictions*, 4(2), 85–92. <https://doi.org/10.1556/2006.4.2015.010>
- Dewald, J. F., Meijer, A. M., Oort, F. J., Kerkhof, G. A., & Bögels, S. M. (2010). The influence of sleep quality, sleep duration and sleepiness on school performance in children and adolescents: A meta-analytic review. *Sleep Medicine Reviews*, 14(3), 179–189. <https://doi.org/10.1016/j.smrv.2009.10.004>
- Hosokawa, R., & Katsura, T. (2018). *Association between mobile technology use and child adjustment in early ele...: EBSCOhost*. 1–17. <http://web.a.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=5&sid=648321f4-1680-43f4-9e87-747075e1610e%40sessionmgr4009>
- Hurlock, E. B. (2011). *Psikologi Perkembangan: Suatu Pendekatan Sepanjang Rentang Kehidupan*. EGC.
- Kozier. (2004). *Fundamental of nursing: concepts, process, practice*. Mosby Year Book Inc.
- 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), 1–7. <https://doi.org/10.1371/journal.pone.0083558>
- Lee, H., Kim, J. W., & Choi, T. Y. (2017). Risk Factors for Smartphone Addiction in Korean Adolescents: Smartphone Use Patterns. *Journal Korean Medical Science*, 32, 1674–1679.
- Lian, L., You, X., Huang, J., & Yang, R. (2016). Who overuses Smartphones? Roles of virtues and parenting style in Smartphone addiction among Chinese college students. *Computers in Human Behavior*, 65, 92–99. <https://doi.org/10.1016/j.chb.2016.08.027>
- Liu, Q. Q., Zhou, Z. K., Yang, X. J., Kong, F. C., Niu, G. F., & Fan, C. Y. (2017). Mobile phone addiction and sleep quality among Chinese adolescents: A moderated mediation model. *Computers in Human Behavior*, 72, 108–114. <https://doi.org/10.1016/j.chb.2017.02.042>
- Nowreen, N., & Ahad, F. (2018). Effect of smartphone usage on quality of sleep in

- medical students. *National Journal of Physiology, Pharmacy and Pharmacology*, 8(9), 1366.
<https://doi.org/10.5455/njppp.2018.8.0620009062018>
- Rahmayani, I. (2015, October). *Indonesia Raksasa Teknologi Digital Asia*.
https://www.kominfo.go.id/content/detail/6095/indonesia-raksasa-teknologi-digital-asia/0/sorotan_media
- Short, M. A., Gradisar, M., Lack, L. C., & Wright, H. R. (2013). The impact of sleep on adolescent depressed mood, alertness and academic performance. *Journal of Adolescence*, 36(6), 1025–1033.
<https://doi.org/10.1016/j.adolescence.2013.08.007>
- Thomé, S., Härenstam, A., & Hagberg, M. (2011). Mobile phone use and stress, sleep disturbances, and symptoms of depression among young adults - A prospective cohort study. *BMC Public Health*, 11.
<https://doi.org/10.1186/1471-2458-11-66>
- Wang, p, Chen, K., Yang, S., & Lin, P. (2019). *Relationship of sleep quality, smartphone dependence, and health-related behaviors in female junior college students*. *Plos One [revista en Internet] 2019 [acceso 14 de mayo de 2019]; 14(4): 1-12*. 1–12.
<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0214769>
- Yen, C. F., Tang, T. C., Yen, J. Y., Lin, H. C., Huang, C. F., Liu, S. C., & Ko, C. H. (2009). Symptoms of problematic cellular phone use, functional impairment and its association with depression among adolescents in Southern Taiwan. *Journal of Adolescence*, 32(4), 863–873.
<https://doi.org/10.1016/j.adolescence.2008.10.006>