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Article

The Correlation Between Anxiety and Smartphone Addiction Among Medical Students

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Abstracts

Introductions: Various studies showed that medical students were more prone to exposure to stress and anxiety than their peers. Along with the rising popularity of smartphones, university students tend to spend time on smartphones to distract themselves from stress. However, the overuse of smartphones may lead to addiction. **Methods:** This study applied a modified version of the Smartphone Addiction Scale (SAS) to assess the level of addiction and Zung's Self-Rating Anxiety Scale (ZSAS) to quantify the severity of anxiety. Based on Spearman's rho statistical test, the value of $p = 0.000$ and $r = 0.297$. **Results:** There are 374 preclinical students included in this study. Most students (47.06%) use smartphones 5-10 hours daily. The majority of students were having mild anxiety (54.81%), followed by moderate anxiety (39.84%) and severe anxiety (5.35%). The results showed that smartphone addiction relates significantly to students' anxiety ($p<0.05$). **Conclusions:** From this study, it can be concluded that there is a positive and significant correlation between anxiety and smartphone addiction among preclinical students in the Faculty of Medicine, Universitas Airlangga.

Keywords: Anxiety, Depression, Medical Students, Smartphone Addiction.

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Introductions

Medical education is often regarded as a stressful environment. Previous studies found that medical students were more exposed to stress and anxiety compared to their peers [1,2]. There are numerous major stressors among medical students, such as academic and financial pressure, competitive and hierarchical environment, lack of life balance, and uncertainties about their future [3,4].

Recent studies have also discovered that the current COVID-19 pandemic has put additional pressure on medical students. Halperin et al. identified an increase of 61% in anxiety and 70% in depressive symptoms among US medical students compared to previous studies before the outbreak [5]. There were growing concerns among students about worries of spreading the disease to family members, less opportunity to attend courses or labs, fear of the possibility of being fast-tracked to the frontline or other areas outside of their study plan, and restriction to finding leisure activities during their free time [6].

Along with the increasing popularity of smartphones, youths tend to spend time on the device to restrain anxiety. In 2016, more than 95% of Indonesian undergraduate students own smartphones [7]. Further studies by Pratama found that more than half of Indonesian university students spent more than five hours daily on their smartphones [8]. He added that this result consistently ranked way above the global average from 2014 to 2017. As a multipurpose device, smartphones enable users to do leisure activities such as mobile gaming, browsing the internet, playing music, and watching movies or videos. Moreover, smartphone communication could deliver freedom from external pressures [9]. These features offer comfort to smartphone users in dealing with stress and anxiety. Karuniawan and Cahyanti wrote that smartphone users frequently spent their time on the device as self-gratification to relieve stress [10]. However, intense attachment to the device may cause its overuse, which can further lead to addiction [11].

Addiction is the inability to control engaging in a behavior or using a substance to the extent that it causes negative consequences. It is commonly associated with dependence on alcohol, drugs, or tobacco. Addiction has recently been used to refer to uncontrolled behavior, including gambling, internet browsing, gaming, and excessive smartphone use [12]. Individuals with excessive smartphone use share common symptoms with other psychological disorders, such as anxiety, sleeping disturbances, self-absorption, and attention-deficit [13]. Previous studies revealed that the adaptation process during the start of medical school has contributed to smartphone addiction among students in Nepal and China [14,15].

Based on the context above, medical students tend to have a higher risk of smartphone addiction. Constant pressure and stress experienced throughout their study increase the need to relieve tensions and psychological burdens. This study analyzed the correlation between anxiety and smartphone addiction among preclinical students in the Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia.

Methods

Participants

This cross-sectional study was designed to investigate the correlation between two core variables—smartphone addiction and anxiety—among medical students at Universitas Airlangga. The target population of this study was preclinical students in their third, fifth, and seventh semesters. To reduce the sample size, this study did not include those who did not sign or return the informed consent form. A total of 374 preclinical students participated in this study.

Research Instrument

This study applied two research instruments. The first instrument was a modified version of the Smartphone Addiction Scale (SAS) by Kwon et al. to assess the risk level of smartphone addiction [16]. This scale comprises six points: (1) daily-life disturbance,

(2) positive anticipation, (3) withdrawal, (4) cyberspace-oriented relationship, (5) overuse, and (6) tolerance. Fauzi et al. carried out a validity and reliability test on 33 middle school students in Surabaya, with the correlation coefficient of all items >0.344 and the Cronbach's Alpha value of 0.857 [17]. This result indicates that all questions are valid and reliable. If Cronbach's Alpha value is more significant than 0.60, then it can be determined that the questionnaire is reliable and consistent. Another study by Anzani et al. stated that SAS has a relatively high level of reliability [18].

The second instrument was Zung's Self-Rating Anxiety Scale (ZSAS) questionnaire, developed by William W.K. Zung in 1971. It is a checklist form mainly aimed at quantifying the level of anxiety. This questionnaire was developed based on the anxiety level in the Diagnostic and Statistical Manual Mental Disorder (DSM–II). This study's questionnaire comprised around 20 questions with five checklist options: never, occasionally, often, and always. Each answer was given a score that accumulated into the final score. A total score between 45 and 59 indicated mild anxiety, 60–74 indicated moderate pressure, and 75–80 showed severe stress symptoms. The ZSAS questionnaire in this study was divided into 15 favorable and five unfavorable questions. Each answer to favorable and unfavorable questions had a different score measurement. The validity and reliability of ZSAS on all statements were valid, with a validity value of >0.444 and a reliability value of 0.887 using the alpha Cronbach [19]. Heryana stated that Zung's Self-Rating Anxiety Scale (ZSAS) instrument used in her research had a Cronbach Alpha value of 0.85, with a correlation coefficient value 0.79 [20]. If the Cronbach Alpha value is closer to 1, the instrument has higher reliability. Then, it can be determined that the device is valid and reliable to be used further in the study.

This research took place between August and October of 2020. Ethical clearance for the study was obtained from the Research Ethics Committee of the Faculty of Medicine, Universitas Airlangga, Surabaya (ref no: 1869/UN3.1.1/DL.10/2020). The questionnaire was created and distributed using Google Forms since it is popular and accessible to most smartphone users. This study used Statistical Package for the Social Sciences (SPSS) and Microsoft Excel to analyze statistical data. The frequency of dependent and independent variables was distributed by using univariate analysis.

Results

Three hundred and seventy-four preclinical students in Universitas Airlangga were included in this study. As shown in **Table 1**, most participants (n = 245, 65.51%) were female. Most participants were second-year (44.39%) students, followed by third-year (30.21%) and fourth-year (25.40%) students, respectively.

Indicator	Sub Indicator	Frequency	Percentage (%)
Gender	Male	129	34.49
	Female	245	65.51
Average daily use	<1 hours	2	0.53
	1–3 hours	23	6.15
	3–5 hours	108	28.88
	5–10 hours	176	47.06
	>10 hours	65	17.38
Academic Year	2nd year	166	44.39
	3rd year	113	30.21
	4th year	95	25.40
Most frequently used social media	WhatsApp	142	37.97
	LINE	92	24.60
	Instagram	68	18.18
	Facebook	52	13.90
	Other	20	5.35

The duration of smartphone usage among the participants was varied. **Table 2** shows that most students (n = 176, 47.06%) use smartphones for 5–10 hours a day. On the other hand, only two students (0.53%) use their smartphones for less than one hour a day. Regarding the use of social media, the majority (n = 142, 37.97%) answered that WhatsApp was their most frequently used application.

The significance value of Asymp. Sig (2-tailed) was 0.200, or more than 0.050. This result showed that the data set used is usually distributed. Hence, the questionnaire data can be used for further analysis.

Level	Category	Value Range	Total	(%)
Level of Anxiety	Mild	20–35	205	54.81
	Moderate	36–50	149	39.84
	Severe	51–65	20	5.35
	Extremely Severe	66–80	0	0.00
Level of Addiction	Negative	33–115.5	225	60.16
	Positive	115.6–198	149	39.84

The correlation between anxiety and smartphone addiction was analyzed using Spearman's Rank Correlation Coefficient or Spearman's rho. As shown in Table 3, this research classified anxiety levels into four categories. Mild anxiety was experienced by the majority of students (n = 205, 54.81%), followed by moderate pressure (n = 149, 39.84%) and severe anxiety (n = 20, 5.35%). None of the participants had extremely severe anxiety. **Table 3** also showed Spearman's rho value of 0.297 and the p value 0.000. There was a significant and positive correlation between anxiety and smartphone addiction since the p-value was less than the probability value of 0.05.

Level of anxiety	Smartphone Addiction				Total
	Addicted		Non-addicted		
	n	(%)	N	(%)	
Mild	82	21.9	123	32.9	205
Moderate	59	15.8	90	24.1	149
Severe	8	2.1	12	3.2	20
Extremely Severe	0	0	0	0	0
Total	149	39.8	225	60.2	374
Spearman's rho p = 0.000 r = 0.297					

Discussion

Medical education is one of the most stressful environments. Medical students experience tremendous stress due to factors such as academic pressure and demanding tasks during training or residency. Consequently, many students spend time on smartphones to entertain themselves within a certain period. Excessive use of smartphones is often regarded as a way to reduce anxiety and divert themselves from pressure. Using smartphones could also deliver a sense of pleasure, increasing the risk of addiction to its users in a more extended period.

The main findings of our study are as follows. There was a significant correlation between anxiety and smartphone addiction among preclinical students at Universitas Airlangga. The level of anxiety experienced by students can cause them to use smartphones more often. Spending time on smartphones is often regarded as a way to restrain anxiety. This study revealed that most participants spent over five hours daily on their smartphones. This was significantly more than the global average of 3 hours and 40 minutes [21]. This finding supports the result of a study by Dermici et al., which found that traits of anxiety and depression were higher in the smartphone overuse group compared to the regular use group [13]. This is also consistent with the findings of a similar study by Pratama, which showed that most university students were using smartphones five hours a day on average, significantly longer than the global average in the previous three years [7]. This result indicated that Indonesian university students—including medical students—tend to overuse smartphones.

Several limitations of this study should be considered. This study only uses a relatively homogeneous—limited to medical students—and a small sample population. Thus, a further study with a larger and more variative sample group needs to be conducted to assess the validity of this scale. Another limitation of this study is the lack of control over the demographic factor. The ratio of the gender and the academic years were not 1:1. Therefore, further studies with a more well-controlled sample group are encouraged.

Based on Spearman's rho results, this study found a positive and significant correlation between anxiety and smartphone addiction among medical students at Universitas Airlangga. This finding indicates that the severity of smartphone addiction will be higher in parallel with the level of anxiety. This research used the Simple Regression Analysis to examine the significant correlation between anxiety and smartphone dependence among the medical students in Universitas Airlangga. The result showed that the anxiety level substantially impacted the severity of smartphone addiction among students. Smartphone overuse occurred due to the need to cope with anxiety. Students tended to spend their time on smartphones to enter-

tain themselves, thus giving a sense of pleasure that could relieve anxiety.

Conclusions

This study's result was aligned with previous studies that found a positive correlation between smartphone addiction and anxiety among medical students. Students with severe anxiety tended to overuse their smartphones as a way to help them relieve stress. This made them more prone to exposure to smartphone addiction. Therefore, there is a need to develop an appropriate intervention mechanism to improve the mental well-being of students and promote the negative impacts of smartphone addiction.

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Conflict of Interest

No potential conflict of interest.

Ethical Clearance

This study was approved by the Research Ethics Committee of the Faculty of Medicine, Universitas Airlangga, Surabaya (ref no: 1869/UN3.1.1/DL.10/2020). All participants were given complete information about what it means to participate in this research and signed a consent form.

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