

## The well-being of Indonesian university students during the pandemic: Smartphone use and sleep quality

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### ABSTRACT

Online learning and the lack of social interactions during lockdown pushed numerous college students to live employing the internet and social media. This study investigates students' well-being and its associated factors in relation to smartphone use and sleep quality among Indonesian university students during the pandemic. A sample of 327 undergraduate students (68 males and 259 females) anonymously completed the Smartphone Addiction Scale – Short Version (SAS-SV), WHO-Five Wellbeing Index (WHO-5), and Pittsburgh Sleep Quality Index (PSQI), along with several socio-demographic data via an online survey. The data was then analyzed with hierarchical linear regression. The results indicate that gender, perceived physical health, smartphone use, and sleep quality were associated with well-being in university students. The final model predicted 23.4 percent of the WHO-5 scores with a significant increase in predictive value by adding perceived physical health and sleep quality. Therefore to enhance well-being among Indonesian university students, suitable physical activities, good sleeping habits, and controlled smartphone use is needed.

### Introduction

The COVID-19 control endeavors have required unexpected and broadly ordered physical separation, eliminating possible sources of social interaction from people's life. The impacts of physical and social separation may be especially substantial for young people (10–24 years old) who went through a phase of social interaction sensitivity (Orben et al., 2020). The prevention measures have had an unanticipated and unprecedented impact on higher education, not only on university administration and classes or exam delivery but also on the interactions between students and professors (Capone et al., 2020). These adaptations have exerted new pressure on students in the form of increased exam-related anxiety due to the unprecedented exam procedures and new and unexpected academic workloads, all of which have been cited as major sources of stress for students (Bedewy & Gabriel, 2015).

During the COVID-19 pandemic, several studies found university students' mental health and well-being problems. Students have been reported with increased depressive and anxiety symptoms (Cao et al., 2020; Li et al., 2020; Odriozola-González et al., 2020; Savage et al., 2020); increased suicidal thoughts, and poor sleep quality (Kaparonaki et al., 2020); as well as increased perceived stress and time spent on sedentary lifestyle (Savage et al., 2020). Nonetheless, another study has reported a relatively normal score of mental well-being and academic stress among Italian students (Capone et al., 2020), while studies from Indonesia have similarly reported only mild levels of depression and anxiety (Soetisna et al., 2021; Sujarwoto et al., 2021). Changes in education policy have demanded certain

adaptations on the part of university students that presumably placed mental health burdens on students. Yet, findings regarding the mental health status are still unclear. Failure to identify and manage mental health issues in young people is a major public health issue in low and middle income countries, with important implications for meeting primary development goals (Kieling et al., 2011).

However, most COVID-19 mental health research has been conducted with the adult population as the focus of attention. However, there is a growing body of evidence of the potential adverse impact of the pandemic on youth's mental health (Chen et al., 2020; Zhou et al., 2020). Therefore, effective strategies must be identified to promote mental health and well-being to protect adolescents against the negative effects of COVID-19.

The other adjustment regarding educational demand and social restrictions that should be made in the COVID-19 pandemic is the rigorous use of the internet and social media among college students. With the limitations in outdoor activities, there is an increase in smartphone use at home to accommodate work, study, leisure, and social contact (King et al., 2020; Király et al., 2020; McKay et al., 2020). The widespread use of smartphones raises concerns about their inherent risks. The overuse of smartphones has a negative effect on psychological well-being (Adams & Kisler, 2013; Elhai et al., 2017). According to the studies, adolescents with a high prevalence of social media use may utilize it as an unhealthy outlet for negative emotions and daily difficulties (Lerma et al., 2021; Sujarwoto et al., 2021). Such coping mechanisms could progress into excessive use and increase the risk of smartphone addiction if left unattended (Islam et al., 2021). Excessive internet use and screen time, particularly in children, adolescents, and young people, can have a negative impact on cognition and development (Neophytou et al., 2021).

Studies have also linked smartphone use and sleep difficulties among young people. According to a cross-national study of undergraduate students, 10.4% of them had significant nocturnal sleep issues in the previous month, with Indonesia (32.9%) having the highest percentage and Thailand (3.0%) having the lowest (Peltzer & Pengpid, 2015). Sleep problems have been linked to smartphone addiction and numerous indicators of problematic smartphone usage among university students and teenagers, including prolonged smartphone use, late-night smartphone use, using a smartphone right before bedtime, and severe smartphone use (Demirci et al., 2015; Huang et al., 2020; Liu et al., 2019; Sahin et al., 2013; Shoval et al., 2020).

Indonesians spend more than 8 hours online daily, with around 3 hours and 26 minutes on social platforms mainly accessed through smartphones (Wong, 2019). Despite smartphones' high consumption and ownership, research about problematic smartphone use in Indonesia is still limited. Previous research reported an association between problematic smartphone use and temperament profile in Indonesian medical students (Hanafi et al., 2019). Another study reported an Indonesian adaptation of the smartphone addiction scale for Indonesian junior high school students (Arthy et al., 2019). These studies are yet to provide a prevalence and a description of problematic smartphone use among university students. Similar research conducted in other Asian countries has reported the high prevalence of problematic smartphone use, such as Taiwan (Wang et al., 2019), China (Huang et al., 2020), the Philippines (Buctot et al., 2020), and South Korea (Kim et al., 2018).

This study aimed to assess the mental well-being of Indonesian college students a few months well after the school closure. This study explores the role of smartphone use and sleep quality on Indonesian college students' well-being during the ongoing COVID-19 pandemic. A further aim was to conduct exploratory analyses to investigate whether socio-demographic characteristics would be associated with well-being, smartphone usage, and sleep quality. It is critical to establish a clear picture of the severity of smartphone use and its associated factors in the adolescent population, given the time they spend on smartphones. Furthermore, there has been no study on the prevalence of problematic smartphone use in young people during the pandemic COVID-19 on Indonesia's population. Knowing the risks may provide

ways to introduce wise smartphone usage with minimum health risks, especially related to sleep quality, to maintain well-being.

## Method

This study used an online cross-sectional research approach among university students in Jakarta. Three hundred forty-five university students were selected through convenience sampling. Eighteen students were excluded due to their incomplete scales. Thus, 327 students (68 males and 259 females; mean age =  $19.2 \pm 1.65$ ) were included in the study. All participants owned and used smartphones regularly. Participants consented to participate in the study and were allowed to withdraw at any time. Data collection took place between August and September 2020. The study was reviewed and approved by the Universitas Tarumanagara's Ethics Committee (PPZ20202077). The confidentiality of participant responses was protected. Therefore, the university received the study's overall conclusions but not the participants' personal information.

## Instruments

All participants completed an online questionnaire generated by Google form that consisted of two sections. The first part of this data included primary socio-demographic data of individual and family characteristics. Questions for individual characteristics include age, birth year, gender, place of origin, smoking exposure, and perceived health (feeling physically healthy in the past week).

The second part of the questionnaire assessed the psychological attributes of the participants. The Smartphone Addiction Scale – Short Version (SAS-SV), developed by [Kwon et al. \(2013\)](#), measures smartphone use in university students. The SAS-SV contains ten items. Participants were asked to respond to statements like “Constantly checking my smartphone so as not to miss conversations between other people on WhatsApp, Facebook, or WeChat” and “The people around me tell me that I use my smartphone too much.” Each item scored on a Likert scale of 1 (*strongly disagree*) to 6 (*strongly agree*). The questionnaire gives an overall SAS-SV score from 10 to 60, with higher scores representing problematic use. SAS-SV is not intended to provide a pathological diagnosis of smartphone addiction but rather to assess the level of smartphone addiction risk and to identify the high-risk group [Kwon et al. \(2013\)](#). [Arthy et al. \(2019\)](#) translated and adapted the Indonesian version of SAS-SV. The Cronbach's alpha of the SAS-SV in this study is .864.

The Pittsburgh Sleep Quality Index ([Buysse et al., 1989](#)) was used to assess sleep problems. This index measures subjective sleep quality over one month. The Pittsburgh Sleep Quality Index, abbreviated PSQI, is a set of 19 self-reported questions that are scored on the following components: sleep latency, subjective sleep quality, sleep duration, sleep efficiency, sleep disruptions, usage of sleep medicine, and daytime dysfunction. These component values were combined to provide a global PSQI score ranging from 0 to 21, with greater scores indicating lower sleep quality. The Indonesian version of the PSQI was previously validated and had a reliability of .79, content validity of .89, and a specificity of 81% ([Alim & Elvira, 2015](#)). The Cronbach's alpha of the PSQI in this study is .68.

Subjective psychological well-being was assessed using the five-item World Health Organization Well Being Index (WHO-5). The WHO-5 has been translated into more than 30 languages and is used in research projects worldwide ([Topp et al., 2015](#)). It consists of five items with positive connotations that reflect the presence or absence of well-being. On a 6-point scale ranging from always (5 points) to never (0 points), participants are asked to indicate the presence of these happy sensations in the preceding two weeks. Higher scores indicate better-perceived well-being or quality of life. The Indonesian version for WHO-5

was used in previous research with good reliability of .83 (Sasmito & Lopez, 2020; Soewondo et al., 2010), while the Cronbach's alpha of the WHO-5 in this study is .827.

### Data Analysis

All data were subjected to descriptive analysis, and major socio-demographic variables were tested for correlation to well-being using linear regression. All variables were examined in several steps using hierarchical linear regression analysis. The following procedures were taken to generate the multiple regression model: The first step was to enter the participants' age and gender (demographic characteristics); the second step was to enter health-related variables, specifically perceived physical health and exposure to smoking behavior; the third step was to enter the severity of smartphone use, and the fourth and final step was to enter sleep quality. Each phase included reporting all standardized coefficients for each variable and the collinearity for the final mode.

Chi-square and Pearson correlations were used to identify the correlation between socio-demographic characteristics and smartphone use severity. Data analysis was performed using version 15 of Stata for Windows at a significant of .05 (StataCorp, 2017).

### Results

Table 1 shows a hierarchical multiple linear regression analysis investigating the association between predictors and the WHO-5 score. Demographic variables explained 1.8% of the variance in the WHO-5, while health-related variables added 13.5% to the estimate. The smartphone use severity predicted an additional 2.5% of the variance, and the final model incorporating sleep quality predicted 23.4% of the WHO-5 variance. Each model has a significant level of less than .05. Being male students with healthy perceived physical health predicted increased well-being scores. In contrast, smartphone usage and poor sleep quality increase predict lower well-being scores in Indonesian university students.

Table 1

*Hierarchical Regression Analysis Predicting Student's Well-being*

Predictor	Step 1 $\beta$	Step 2 $\beta$	Step 3 $\beta$	Step 4 $\beta$	$b^a$	SE <sup>a</sup>	Tolerance <sup>a</sup>
Demographic							
Gender (male)	5.730*	4.630*	3.410	4.450*	.111	2.200	.77
Age	-.905	-.846	-.787	-.718	-.073	.484	.96
Health-related							
Perceived health (healthy)		11.910***	10.980***	8.360***	.244	1.750	.88
Smoking exposure		-.819	.888	.712	.015	2.480	.79
Smartphone use			-.267**	-.191*	-.121	.081	.89
Sleep quality (poor)				-10.110***	-.291	1.780	.88
Adjusted R <sup>2</sup>	.018*	.135***	.160***	.234***			
$\Delta R^2$		.117	.025	.074			

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ ; <sup>a</sup>Measure of the last model

Unadjusted and adjusted regression analyses stratified by participants' perceived health with sleep quality and smartphone use as the main exposure variables were conducted. In Table 2, the models showed a significant effect of perceived physical health on the association between sleep quality, smartphone use, and the well-being of university students. Model 2 was adjusted for gender and age. Both sleep quality and smartphone use were significantly negatively associated with mental well-being among university students with good

perceptions of their physical health ( $\beta = -8.92$  and  $\beta = .303$ , respectively). Sleep quality affects students' well-being, regardless of their health perceptions, while smartphone use did not influence students with poor perceived physical health ( $\beta = .051$ ,  $p > .05$ ).

Table 2  
*Associations between Main Predictors and Student's Well-being*

Variables	Model 1		Model 2	
	<i>Perceived health</i>		<i>Perceived health</i>	
	poor	good	poor	good
Sleep quality	-13.360**	-8.570***	-14.290***	-8.920***
Smartphone use score	.014	-.327**	.051	-.303**

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

Table 3 presented the general characteristics of the study participants stratified by their smartphone usage. Smartphone use severity was categorized into low and high problematic use, using a cutting score of 32 for males and 34 for females from the previous Indonesian study (Arthy et al., 2019). Most of the participants in this study were female students (79.2%) with a mean age of 19.2 years ( $SD = 1.65$ ). The participants primarily used their smartphones for social networking applications (48.6%) and playing games (38.5%). Most students in this study had not been exposed to smoking behavior (85.3%), felt lonely for at least one or two days in a week (79.2%), and had a healthy perception of their physical health (66.1%).

The average well-being score in this study is 60.6 ( $SD = 16.2$ ), with higher scores in participants in the low smartphone usage group (69.63,  $SD = 15.19$ ), whereas the average sleep quality score in this study is 7.03 ( $SD = 2.85$ ). There was a significant difference in smartphone use and sleep quality. Among 222 participants with poor sleep quality, the high smartphone usage group had a higher percentage than the low group (75% and 62.3%, respectively). On the other hand, most participants with good sleep had low smartphone use. There was no significant difference in the distribution of gender and age between the two groups of smartphone use severity. However, female participants have higher problematic smartphone use than their male counterparts.

Table 3  
*The Characteristics of the Participants by Smartphone Usage*

	N = 327	Smartphone usage		<i>Effect size</i> Cohen's <i>d</i>	<i>p</i>
		Low (n=183, 55%)	High (n=144, 44%)		
Gender					
Male	68 (20.8)	42 (22.9)	26 (18.1)		.279
Female	259 (79.2)	141 (77.1)	118 (81.9)		
Smoking exposure					
Yes	48 (14.7)	20 (10.9)	28 (19.4)		.031
No	279 (85.3)	163 (89.1)	116 (80.6)		
Perceived health					
Healthy	216 (66.1)	134 (73.2)	62 (43.1)		.002
Unhealthy	111 (33.9)	49 (26.78)	82 (56.9)		
Sleep quality					
Good	105 (32.1)	69 (37.7)	36 (25)		.015
Poor	222 (67.9)	114 (62.3)	108 (75)		
Well-being Index	60.6 ± 16.20	69.63 ± 15.19	56.34 ± 14.90	.883	< .001
Age	19.20 ± 1.65	19.10 ± 1.49	19.25 ± 1.72	.091	.451

## Discussion

This study investigated factors associated with the well-being of Indonesian university students, mainly in Jabodetabek (Jakarta, Bogor, Depok, Tangerang, Bekasi) areas, a few months after the school closure due to the COVID-19 pandemic. Based on the cutoff score presented in previous studies, approximately 25% of the total participants had a low well-being score, with a mean score lower than 50 (Dodd et al., 2021; Topp et al., 2015). This finding strengthened previous findings from Indonesian studies that revealed modest levels of depression and anxiety among university students in Indonesia during the pandemic (Soetisna et al., 2021; Sujarwoto et al., 2021).

The results from the hierarchical regression show a positive correlation between sleep quality and well-being in Indonesian college students. This study's average global sleep quality score was higher than the suggested score in prior literature (Buysse et al., 1989; Herawati & Gayatri, 2019; Wang et al., 2019). Poor sleep quality was found in more than half of the students in this study. Similarly, a previous study found that inadequate sleep was more widespread and severely impacted mental health during the pandemic lockdown (Franceschini et al., 2020). Poor sleep quality affects well-being in both psychosocial and physical aspects. Insufficient sleep among adolescents has been associated with mood disturbances (Moore et al., 2011), somatic and psychosocial health, school performance, and risk-taking behavior (Shochat et al., 2014).

This study established a 44% prevalence of suspected severe smartphone use, meaning those with a high risk of smartphone addiction, among Indonesian college students during the COVID-19 outbreak. Smartphone use was also a predictor of university students' well-being, with the well-being score significantly lower in the high smartphone use group than in their counterparts. This association is related to adolescents' social media use since past evidence showed that adolescents mostly use their smartphones to access the internet and social networking sites (Buctot et al., 2020; Pratama & Scarlatos, 2020). Previous evidence has established the linkage between social media and internet addiction to mental health status in adolescents. Adolescents who spend more time online and on social media platforms are more likely to suffer from anxiety and despair (Banjanin et al., 2015; Sujarwoto et al., 2021). Prolonged social media and internet use may cause adolescents to lose sleep as they linger on their smartphones.

On the other hand, sleeping problems may result from their extensive internet use. Additionally, other research suggests that sleep disorders may occur due to emotional and behavioral concerns and may contribute directly to the development of internet addiction during adolescence (Siste et al., 2021). Additionally, a systematic study discovered that individuals who engage in problematic smartphone use face considerably higher risks of poor sleep quality, anxiety, and depression (Yang et al., 2020), and limited social media use might cause a small improvement in well-being (Graham et al., 2021).

Age and gender were not significantly related to smartphone use in this study. Several studies reported no significant gender difference in smartphone usage (Chen et al., 2017; Long et al., 2016). Others showed significant differences with female adolescents as more vulnerable to problematic smartphone use (Emirtekin et al., 2019; Randler et al., 2016). Nevertheless, it is important to note that female students in this study had higher proportions of severe smartphone use than male students. This result is consistent with similar previous research in Indonesia (Dewi et al., 2018; Dhamayanti et al., 2019). Female adolescents often see smartphones as a means of social contact in which messaging and social network apps play prominent roles (Arthy et al., 2019; De-Sola et al., 2016). Voice calls, text messages, and social networks were reported as the most complex applications (Roberts et al., 2014). This condition might explain the higher score of severe smartphone use in female students. Nevertheless, studies still need to explore the inconsistent prevalence of gender differences in smartphone use severity among studies.

Additionally, the finding shows students with specific characteristics, including poor sleep quality, being exposed to smoking behavior, and having an unhealthy perception of their physical health, are significantly associated with severe smartphone usage. On the other hand, students with good sleep quality who have never been exposed to smoking behavior and had good health perception are associated with low smartphone use. Previous research on college students revealed that sleep quality is related to health-related behaviors, including smartphone dependence and nutritional intake, and thus affects physical and mental health (Wang et al., 2019). It is worth noting that a few past research found associations between increased smoking risk and vaping behavior with social media exposure through smartphones in college students (Massey et al., 2021; Shadel et al., 2013).

The COVID-19 pandemic did cause significant disruptions in higher education. This study's findings have identified several factors to maintain a good level of well-being for university students: how they perceive their physical health, smartphone use, and sleep quality. This finding is expected because the relationship between health and well-being is interchangeable. Poor physical health or illness can influence one's well-being, just as it can influence them (Diener et al., 2018). A study of Italian adolescents reported a significant increase in average daily smartphone use during the pandemic (Serra et al., 2021). People's behavior, particularly that of children and teenagers, may be altered by the COVID-19 pandemic to mitigate some of the impacts of the crisis (Dong et al., 2020). During social isolation, adolescents may have depended more on smartphones as a source of communication, information, and entertainment than they would have under normal conditions (Serra et al., 2021).

Nevertheless, university students should manage the use of smartphones, regulate and manage their sleep, and improve or maintain physical health (Faulkner et al., 2021; Serra et al., 2021). Students need to pay attention to the length of their screen time and learn to do activities apart from their smartphones or other electronic gadgets. This study invites university officials and lecturers to team up and think up alternative ways of teaching with a suitable balance of proportions between digital and physical aspects of learning. Such methods could be even more relevant under the notion of a hybrid learning program as a new way of learning in these ongoing new-normal circumstances.

It is important to acknowledge the limitations of the present study that can be used to guide future research. First, this study involved a single demographic, university students; additional research is needed to corroborate our findings in other populations to develop a more comprehensive understanding of youth well-being. This study was conducted during a specific situation, the COVID-19 pandemic; therefore should be considered when interpreting the study results. Second, it is essential to acknowledge that our sample size was modest, resulting in weaker conclusions. Future studies should employ a bigger sample size to increase statistical power. Third, it is important to stress that our data were correlational; therefore, no causal implications can be made. Fourth, our research did not investigate social network addiction or maladaptive use, which could be a helpful indicator of the possibility that excessive social network use results in problematic behavior. As a result, comparative research in the future should incorporate scales to assess social media addiction or maladaptive use.

Despite these limitations, this study's results can be used to formulate a recommendation on how to improve the well-being of young people despite the inescapable use of technology. Regulated and controlled technology use is necessary to maintain prolonged usage, especially in young people. Knowing the risks of smartphone use and low sleep quality to psychological well-being may raise awareness of wise smartphone usage with minimum health adversity.

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## Conclusion

This study found the risk factors for Indonesian students' well-being during the COVID-19 pandemic consist of gender, poor physical health perceptions, sleep problems, and excessive smartphone use. These findings confirmed that physical and mental aspects are essential in youth well-being. Suitable physical activities, good sleeping habits, and controlled smartphone use are needed to nurture mental health during home confinement.

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## Declarations

**Author contribution.** BM designed the study, collected the data, performed the statistical analysis, and wrote the article. GES designed the study and wrote the article. The authors read and approved the final manuscript.

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