Smartphone use as a mediator of self-control and emotional dysregulation in nomophobia: A cross-national study of Indonesia and Malaysia

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Abstract: Nomophobia has become a worrying phenomenon among young people. Therefore, research is needed to understand this condition more deeply. This study explores cross-cultural differences in nomophobia, emotional dysregulation, self-control, and smartphone use among a sample of university students in Yogyakarta, Indonesia, and Pahang, Malaysia. In addition, it examines smartphone use as a mediator of the effects of emotional dysregulation and self-control on nomophobia. Currently, only a limited amount of research tests explicitly the nomophobia-mediated model across different countries. This study used a cross-sectional design that involved university students from Yogyakarta and Pahang, comprising 215 students from Yogyakarta and 211 from Pahang, resulting in 426 participants. Among these, 110 (25.8%) were female and 316 (74.2%) male, with an average age of 18 (SD = 3.4), who were recruited using purposive sampling. Manova and regression analyses were conducted to examine the hypotheses, with an initial assessment of data normality, multicollinearity, and homogeneity assumptions performed before the analysis. Data were collected using scales for nomophobia, emotional dysregulation, self-control, and smartphone use. The study results indicate that students from Pahang exhibit higher levels of smartphone use and nomophobia compared to those from Yogyakarta (mean: 37.03 vs. 52.137; F = 151.19, p = .000). Emotional dysregulation and smartphone use consistently demonstrate a significant positive role in nomophobia across national contexts (β = .191, p = .002), (β = -.414, p = .000). At the same time, self-control does not have a significant direct influence on nomophobia. The findings indicate the significant role of emotional dysregulation and smartphone use in nomophobia, the management of which will have implications for mitigating nomophobia.

Keywords: emotional dysregulation; nomophobia; self-control; smartphone use

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Introduction

Nomophobia is a recent issue, recognized as anxiety and fear when one is unable to use a smartphone, is away from it, or does not have it, which can impact an individual's psychological well-being (Bekaroğlu & Yılmaz, 2020; Dixit et al., 2010; King et al., 2010; King et al., 2014; Lee, 2014; Yildirim et al., 2016; Yildirim & Correia, 2015). Nomophobia, short for "no mobile phone phobia," is the "fear of being disconnected from one's smartphone" (SecurEnvoy, 2012). It was first identified in a study conducted in 2008 by the UK Post Office to investigate anxiety experienced by smartphone users (SecurEnvoy, 2012).

The prevalence of nomophobia in developed and developing countries ranges from 25.46% to 70.76%, with the highest occurrence in the young adult population (Jahrami et al., 2023; Ozdemir et al., 2018). The condition affects 18.5–73% of students (Dixit et al., 2010; Kaur et al., 2015; Liu et al., 2022). Individuals experiencing nomophobia exhibit specific characteristics, such as using multiple phones and chargers, frequently checking their phone screens for notifications, and keeping their phones closed while sleeping (Bhattacharya et al., 2019). Nomophobic individuals tend to avoid face-to-face interactions and prefer the virtual world of connections (Bhattacharya et al., 2019; Jahrami et al., 2023). Previous research has found clinical manifestations in individuals with nomophobia, including tachycardia (increased heart rate), excessive sweating, difficulty in breathing, confusion, and anxiety (Bhattacharya et al., 2019; Kaur et al., 2015).

Several previous studies have also identified different variables correlated with nomophobia, including demographic factors such as age (Darvishi et al., 2019; Dasgupta et al., 2017; Musa et al., 2017); context (Dasgupta et al., 2017); the presence of carpal tunnel syndrome (Lee et al., 2012); and gender (Argumosa-Villar et al., 2017; Arpaci et al., 2017, 2019; Darvishi et al., 2019;

Yildirim et al., 2016). Other studies have found associations between various psychological variables and nomophobia, such as anxiety (Arpaci et al., 2017; Ayar et al., 2018; Darvishi et al., 2019; King et al., 2013); panic disorders (King et al., 2013; King et al., 2010); stress (Tams et al., 2018); depression; avoidance or antagonistic attitudes (Adawi et al., 2019; Arpaci et al., 2017); obsessiveness (Adawi et al., 2019; Lee et al., 2018); and FOMO (fear of missing out) (Hamutoglu et al., 2018). One of the factors correlated with nomophobia is self-control.

It refers to the ability to regulate one's actions and urges, evaluated through an individual's capacity to resist temptation, defer immediate gratification, and manage their impulses. This skill involves a conscious effort to restrain or override reactions, promoting more positive behavior in accordance with moral principles, societal expectations, and long-term objectives (Baumeister et al., 2007; Tangney et al., 2004). Proficient self-control can aid in navigating smartphone and internet usage, allowing one to steer clear of the addictive behaviors associated with them and to prioritize endeavors aligned with future success (Guner & Demir, 2022; Baumeister et al., 2007). Moreover, adequate self-control facilitates effective time management by prioritizing essential tasks over less crucial ones (Adler, 2015; Servidio, 2021; Vohs & Faber, 2007). Furthermore, Güner and Demir (Akyol Guner & Demir, 2022) identified a significant inverse relationship between self-control and nomophobia and smartphone addiction, while Qiufeng et al. (2021) established a connection between self-control and smartphone addiction.

Effectively managing one's emotions is crucial to well-being and interpersonal connections (Cameron & Overall, 2018; Webb et al., 2018). Emotional regulation encompasses the capacity to handle and govern one's emotions, deal with stress, and control moods. The assessment of emotional regulation involves gauging an

individual's ability to alter various aspects of their emotional response, such as the type, intensity, duration, and quality of emotion. These adjustments can occur spontaneously or through conscious effort and are aimed at influencing the emotional generation process (Gross, 1999; Mauss et al., 2006).

On the other hand, improper emotional regulation can negatively impact individuals (Gruber et al., 2011; Parrott, 1993; Salovey et al., 2009). For instance, uncontrolled anger directed toward someone could lead to violent actions, such as murder or molestation. Therefore, emotions are considered maladaptive when expressed inappropriately, at the wrong time, or at an excessive level. In such situations, individuals require adaptive emotional regulation strategies (Gross, 1999; Gross et al., 2006).

According to the self-regulation deficit model theory, deficiencies in controlling urges and negative emotions are identified as the underlying cause of nomophobic behavior (Tangney et al., 2004). Individuals with self-regulation deficits tend to overuse their smartphones as a compensation mechanism for perceived pressure and stress, resulting in a situation in which the inability to use their smartphones triggers fear and anxiety. Previous studies have indicated a connection between regulating emotions to mobile device anxiety, namely nomophobia (Ali et al., 2017). Additionally, it has been found that extroverts with deficits in awareness, attention, emotional stability, and self-esteem are more susceptible to experiencing nomophobia (Argumosa-Villar et al., 2017; Arpaci et al., 2017, 2019).

Previous research has also indicated that the frequency and duration of smartphone usage increase negative consequences, including nomophobia (Arpaci et al., 2019; Dongre et al., 2017; Kara et al., 2021; Yildiz Durak, 2019). The propensity for nomophobia tends to increase with more extended periods of smartphone use, and a higher frequency of smartphone use also

correlates with a stronger nomophobic tendency (Dongre et al., 2017; Kara et al., 2021). The excessive use of smartphones has been linked to a decline in academic achievement and work productivity (Ozdemir et al., 2018), fostering a significant dependence on smartphones (Gutiérrez-Puertas et al., 2019) and causing distractions during academic learning and laboratory activities (Aguilera-Manrique et al., 2018; Mendoza et al., 2018).

As of 2022, smartphone user penetration in Malaysia was estimated to have surpassed 89 percent, exceeding the overall smartphone adoption rate in the Asia-Pacific region (Statista, 2023b). The anticipated growth in smartphone users in Malaysia is projected to reach over 30 million by 2025. Predominantly, millennials and Gen Z users constitute the majority of consumers in the country, boasting the highest percentage of smartphone ownership across different age groups. Over 98 percent of Malaysian consumers are connected to the internet through handheld phones (Statista, 2023b). In 2022 alone, Malaysians downloaded over 1.2 billion mobile apps, with popular choices including messenger apps like Whatsapp and social media platforms like Instagram and TikTok (Statista, 2023b).

Concurrently, in 2023, Indonesia was projected to have over 190 million smartphone users, positioning it as the fourth-largest global market for such devices after China, India, and the United States (Statista, 2023a). Anticipated smartphone penetration in Indonesia is expected to grow by 18.8 percentage points from 2024 to 2028, reaching a peak of 70.94 percent (Statista, 2023a). The consistent increase in the penetration rate over the past nine years is noteworthy. As of the third quarter of 2022, on average Indonesians spent 7 hours 42 minutes daily on the internet, with an additional average of 3 hours 18 minutes dedicated to social media (Statista, 2023a). These statistics highlight the pervasive integration of the internet into daily activities across the country.

Analyzing cultural variations across different nations is a crucial aspect of cross-cultural research on human behavior, sparking significant academic discourse (Madden, 2005). Leung (1989) asserts that merely identifying cross-cultural differences is insufficient; instead, the primary objective should be exploring the connection between these differences and cultural processes. Several scholars have recommended testing a theory in cross-cultural studies to enhance the comprehension of such differences (Berry, 2002). Berry et al. (2002) proposed that, when conducting cross-cultural research, it is essential to scrutinize data both within and across cultures to test explanatory variables at multiple levels, thus ensuring the cross-cultural reliability and validity of theories.

This study aims to propose and validate the nomophobia model cross-nationally among a sample of students in Yogyakarta, Indonesia, and Pahang, Malaysia. In addition, it will investigate variations in nomophobia among the Indonesian and Malaysian student samples, delving into cross-national differences. The Javanese and Malay are characterized by specific values, norms, beliefs, behavioral patterns, and circumstances, which set them apart. The study will also analyze the connection between self-control and emotional dysregulation of nomophobia, with smartphone use as a mediating factor. The examination of cultural distinctions between Indonesia and Malaysia adds an intriguing aspect to the research, while the investigation of relationships between the specified variables is the central focus. Notably, there is a gap in the related research, as no previous studies have explored nomophobia in these two countries simultaneously.

Within a nation, numerous cultures coexist, each characterized by distinct norms, beliefs, and values. This study focuses on the cultural differences between the Javanese people in Indonesia and the Malay people. Tangible characteristics, such as values, norms, beliefs,

behavioral patterns, and situations, differentiate the Javanese from the Malays. Javanese culture emphasizes values such as calmness, harmony, and balance, which are integral to both Javanese mysticism and daily life (Walton, 2008). Geertz (Geertz, 1960) underscores the significance of the "*rasa*" concept in Javanese society, which influences mystical practices, art, and etiquette. The supreme values guiding Javanese life include being "*bener*" (correct), "*pener*" (appropriate), and "*slamet*" (safe); these embody the ideal Javanese individual, who should be wise and committed to doing good things (Sutarto, 2006).

In contrast, Malay culture emphasizes self-respect, politeness, sensitivity to feelings, and valuing relationships. Apologetic behavior signifies humility among Malays (Abdullah, 1992). Influenced by Islamic principles, which most Malays adhere to, the Malays' code of conduct is shaped by Islamic values. Malays, constituting the largest ethnic group in Malaysia, exhibit a collective orientation and are motivated by affiliations with groups, families, and individuals. They respond positively to increased productivity when benefits extend beyond the organization to include family, community, and nation. Tangible rewards and opportunities for showing and receiving appropriate respect are key factors in satisfying Malays in their work (Abdullah, 1992).

This research will explore the nomophobia-related cross-national differences in the Indonesian and Malaysian student samples. The study will examine the influence of self-control and emotion dysregulation on nomophobia as mediated by smartphone use. The cultural differences between Indonesia and Malaysia will be interesting to observe while also testing the relationships between the variables that are the focus of the research. Furthermore, no study has examined nomophobia in the two countries (Arpaci et al., 2019; Ayar et al., 2018; Darvishi et al., 2019; Liu et al., 2022). Therefore, the following hypotheses are tested:

(H1) There is a fit between the proposed theoretical model and empirical data on the roles of self-control and emotional dysregulation mediated by smartphone use in nomophobia among samples from Indonesia and Malaysia.

(H2) Self-control has a direct relationship with nomophobia.

(H3) Emotional dysregulation has a direct relationship with nomophobia.

(H4) Self-control has a direct relationship with smartphone use.

(H5) Emotional dysregulation has a direct relationship with smartphone use.

(H6) Smartphone use has a direct relationship with nomophobia.

(H7) Smartphone use mediates between self-control and, emotional dysregulation and nomophobia.

Methods

Participants

This cross-national study was conducted in Yogyakarta, Indonesia, and Pahang, Malaysia, and involved university students from the two cities; 215 students were recruited from Yogyakarta and 211 from Pahang, making a total number of respondents 426. Among these, 110 (25.8%) were female, and 316 (74.2%) were male, with an average age of 18 (SD = 3.4). Informed consent was obtained before participation, ensuring voluntary involvement without coercion. Data collection, conducted through purposive sampling, occurred over two months, from 12 September 2023 to 24 November 2023. The participants received ballpoint pens as a token of appreciation. The research adhered to the principles outlined in the Declaration of Helsinki and received approval from the Research Ethics Committee of Universitas Ahmad Dahlan (Ethics Number: 012306101 KEP UAD). Additionally, the researchers secured a data collection permit from the university administration.

Measurement

To adapt or modify a scale, we followed the International Test Commission (ITC) guidelines, which involve several critical steps to ensure its validity and reliability in a new cultural context (Hernández et al., 2020). First, a literature review and needs assessment are conducted to identify why the scale needs adaptation and to understand its theoretical framework. Next, an initial translation is made involving forward translation into the target language by a bilingual expert and back translation into the original language by a different expert to check for consistency. An expert panel, including linguists, psychologists, and subject matter experts from both cultures, then reviews these translations for cultural relevance and conceptual equivalence, making necessary adjustments.

Pre-testing through cognitive interviews with a small sample from the target population follows to collect detailed feedback on clarity and cultural appropriateness. Subsequently, field testing is conducted with a representative sample from the target population, followed by statistical analysis to evaluate the scale's psychometric properties. Reliability is assessed through internal consistency, and validity evaluated by content validity and confirmatory factor analysis. Based on these evaluations, the scale is revised by modifying or removing items as needed, and if significant changes are made, the modified scale is re-tested. The entire process is documented meticulously, including all decisions and rationales, and the adaptation process and findings are reported comprehensively. Finally, administrators who will use the scale are trained in the new context, and its performance is monitored in practice, with further adjustments made if necessary. This comprehensive procedure ensures that the adapted scale maintains its scientific integrity and cultural appropriateness (Hernández et al., 2020).

Nomophobia was assessed using the No Mo Phobia-Questionnaire, developed by Yildirim and Correia (2015). The questionnaire identifies four factors through exploratory factor analysis (EFA): "unable to communicate," "lost connection," "unable to access information," and "fear of losing comfort." The scale modification included back-to-back translation and adjustment of item sentences. Examples of items included "I would feel uncomfortable without constant access to information through my smartphone," "I would be nervous because I would be disconnected from my online identity," and "Running out of battery on my smartphone would scare me." The nomophobia scale exhibited total item correlation ranging from .311 to .775, with a Cronbach's alpha coefficient of .855. We also conducted a CFA test for the nomophobia scale with satisfactory results. The item loading factors ranged between .637 - .889, while the goodness of fit indices were CFI = .976, TLI = .952, and RMSEA = .089.

Self-control was gauged using the scale developed by Tangney et al. (2004), which covers aspects such as regulating thought and emotion, resisting temptation, breaking habits, and maintaining self-discipline. Example items included "People would describe me as impulsive," "I sometimes drink or use drugs to excess," and "I have a hard time breaking bad habits." The back-to-back translation during adaptation, involving experts fluent in English, yielded a total item correlation between .324 and .479. The Cronbach's alpha coefficient for the self-control scale was .726. We also conducted a CFA test for the self-control scale, which yielded satisfactory results. The item loading factors ranged between .570 - .888, while the goodness of fit indices were CFI = .983, TLI = .965, and RMSEA = .055.

Emotional dysregulation was assessed using the Difficulties in Emotion Regulation Scale (DERS) (Gratz & Roemer, 2004), consisting of six aspects: strategies, non-acceptance, clarity, awareness, goals, and impulse. The adaptation process also incorporated back-to-back translations by English-fluent experts. Examples of the items were "When I'm upset, I become angry with myself for feeling that way," "I pay attention to how I feel," and "When I'm upset, I lose control over my behaviors." The emotion regulation scale exhibited a total item correlation between .275 and .679, with a Cronbach's alpha coefficient of .609. We also conducted a CFA test for the emotional dysregulation scale, whose results were satisfactory. The item loading factors ranged between .588 - .988, and the goodness of fit indices were CFI = 1.0, TLI = 1.0, and RMSEA = .000.

To assess smartphone usage among the participants, the researchers developed a self-report questionnaire focusing on the intensity of use, which comprised two dimensions: frequency and duration of screen time. This measurement captured both how often individuals used their mobile phones and the amount of time they actively spent engaged with the device and its screen, including activities such as browsing the internet, using social media apps, playing games, and watching videos. Response options ranged from "strongly agree" to "strongly disagree." Sample items in the questionnaire included statements such as "I frequently check my phone,"; "I spend more time on my phone than on other activities," and "I spend approximately 12 hours a day using my phone." The total item correlation of the smartphone usage scale ranged from .353 to .483, with a Cronbach's alpha coefficient of .774, indicating good internal consistency. We also conducted a CFA test for the smartphone use scale with satisfactory results. The item loading factors ranged between .670 and .915, while the goodness of fit indices were CFI = 1.0, TLI = 1.0, and RMSEA = .000.

Data Analysis

Manova, regression and path analyses were performed to investigate the hypotheses. Before

analysis, data normality and homogeneity assumptions were assessed. SPSS 26 for Windows was utilized for all data calculations.

Results

Manova was conducted to examine whether there were differences in nomophobia, self-control, emotional dysregulation, and smartphone use between Indonesian and Malaysian students. Additionally, regression analysis was performed to test the relationships between smartphone use, self-control, and emotional dysregulation, with nomophobia separately, among the same students. Moreover, path analysis was conducted to investigate the mediating model of smartphone use on self-control and emotional dysregulation with nomophobia in both countries.

Table 1 presents the descriptive statistics of the results of the Manova test for Indonesia and Malaysia. The analysis results indicate a difference in the level of nomophobia between Indonesia (M = 37.023) and Malaysia (M = 52.137), with Malaysia having a higher mean value compared to Indonesia (F (1, 424) = 151.19, p < .000, ή²p = .263). In the self-control variable, it is shown that there is also a difference between Indonesia (M = 35.16) and Malaysia (M = 52.53), with Malaysia having a higher level of self-control compared to Indonesia (F (1, 424) = 494.61, p < .000, ή² = .538). In the emotional dysregulation variable, there is no significant difference between Indonesia (M = 21.55) and Malaysia (M = 20.46) (F (1, 424) = 1.554, p < .213, ή²p = .004). In the smartphone use variable, a difference is evident between Indonesia (M = 12.72) and Malaysia (M = 16.23), with Malaysian students having a higher frequency of smartphone use than those in Indonesia (F (1, 424) = 63.705, p < .000, ή²= .131).

Results from the Yogyakarta Sample

The results of the intercorrelation between the variables in the Yogyakarta sample indicate that self-control is not significantly correlated with nomophobia. However, smartphone use (r = .549) and emotional dysregulation (r = .196) positively correlate with nomophobia. The higher the smartphone use and emotional dysregulation, the higher the level of nomophobia. Conversely, the lower the level of smartphone use and emotional dysregulation, the lower the level of nomophobia. Table 2 presents the Yogyakarta sample's mean, standard deviation, and intercorrelation.

The subsequent testing with regression analysis on the Yogyakarta sample indicated that smartphone use (β = .701) and emotional dysregulation (β = .240) predict nomophobia (F = 40.578, df = 3, p = .000). However, self-control (β = -.126) does not make a significant contribution to nomophobia. The jointly proposed regression model predicts 32.9% of nomophobia in the Yogyakarta sample. Table 3 presents the results of the regression analysis on the sample.

The following path analysis conducted on the Yogyakarta sample reveals several key findings. First, there is a significant negative relationship between self-control and smartphone usage (β = -.191, p = .000). This indicates that higher levels of self-control are associated with lower smartphone usage, suggesting that individuals with higher self-control tend to use smartphones less.

The second finding indicates a significant positive relationship between emotional dys-regulation and smartphone usage (β = .797, p = .000). This implies that higher levels of emotional dysregulation are associated with increased smartphone usage. Individuals with lower emotional control or difficulty managing emotions tend to use smartphones more intensively.

The third finding demonstrates that the level of nomophobia is influenced by two variables: smartphone usage and emotional dysregulation. Such usage is significantly positively related to nomophobia (β = .701, p = .000).

This suggests that as smartphone usage becomes more intensive, the level of nomophobia

in individuals also increases. Meanwhile, emotional dysregulation is significantly positively related to nomophobia (β = -.240, p = .008). This indicates that individuals struggling to regulate their emotions tend to have higher levels of nomophobia compared to those with good emotional regulation.

The fifth finding shows that the direct role of self-control in nomophobia is not statistically significant (β = -.004, p = .953). This suggests that in this model, the level of self-control does not significantly impact the level of nomophobia. The model provides an overview of the tendencies of smartphone usage and nomophobia, which can be understood through the crucial roles of self-control and emotional dysregulation in this context. Figure 1 illustrates the results of the path analysis model for the Yogyakarta sample.

Table 1

DF, Mean, Standard Deviations (σ), F-test, and Effect Size

	df1	df2	Indonesia* Mean	Malaysia** Mean	F	p	ή²
Nomophobia	1	424	37.023 (6.49)	52.137 (16.78)	151.19	.000	.263
Self-control	1	424	35.16 (4.75)	52.53 (10.39)	494.61	.000	.538
Emotional dysregulation	1	424	21.55 (11.79)	20.46 (4.72)	1.554	.213	.004
Smartphone use	1	424	12.72 (3.78)	16.23 (5.21)	63.705	.000	.131

*N = 215
**N = 211

Table 2

Mean, SD, and Intercorrelation between Variables for the Yogyakarta Sample

|	Mean	SD	1	2	3	4
Nomophobia	37.218	6.466	-			
Self-control	35.712	4.888	.039	-		
Emotional dysregulation	23.329	12.335	.196**	.684**	-	
Smartphone use	12.992	3.716	.549**	.297**	.627**	-

p < .05*; p< .00**

Table 3

Regression Analysis for Determinant Variables for Nomophobia (Yogyakarta Sample)

	R	Adj. R	df	F	B	β	t	p
Self-control	.581	.329	3	40.578	-0.006	-.126	-0.059	.953
Emotional dysregulation					0.126	.240	2.642	.009
Smartphone use					1.220	.701	10.087	.000

Figure 1
Path Analysis Model for the Yogyakarta Sample
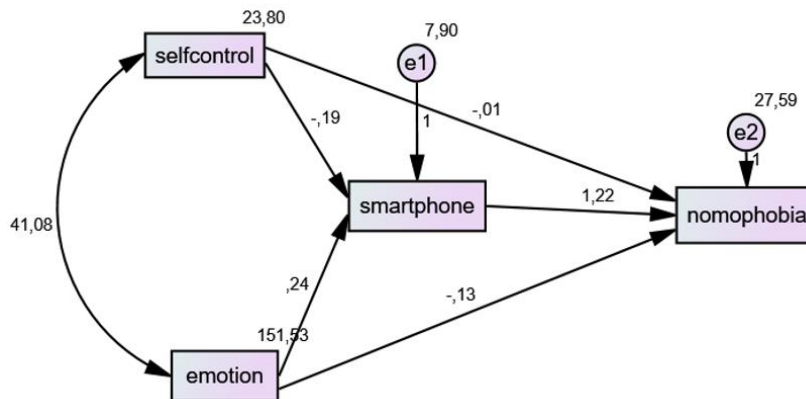
Mediation Test of the Yogyakarta Sample

We tested the mediation effect of smartphone use using bootstrapping through path analysis. In the Yogyakarta sample, it is evident that smartphone use mediates the effect of emotional dysregulation and self-control. Table 4 presents evidence that smartphone use plays a significant mediating role in nomophobia. Specifically, it shows a positive indirect effect on nomophobia, with lower and upper bounds of .451 and .684 respectively, and a p-value = .003. This suggests that higher levels of emotional dysregulation are associated with increased nomophobia. Conversely, self-control exhibits a negative indirect effect on nomophobia, with lower and upper bounds of -.279 and -.075 respectively, and p-value = .003. This indicates that higher levels of self-control are linked to decreased nomophobia. These findings underscore the psychological impact of emotional dysregulation and self-control on nomophobia mediated by smartphone use.

Results from the Pahang Sample

In the Pahang sample, the intercorrelation results indicate that self-control (r = .097) has no significant correlation with nomophobia. However, smartphone use (r = .428) and emotional dysregulation (r = .260) significantly correlate with it. Table 5 presents the mean, standard deviation, and intercorrelations from the Pahang sample.

Regression analysis was then conducted to test the contribution of each predictor variable to nomophobia. The results of this indicate that smartphone use (β = .414) and emotional dysregulation (β = .191) significantly contribute to nomophobia (F = 21.234, df = 3, p = .000). On the other hand, self-control (β = .088) does not make a significant contribution to nomophobia. Table 6 presents the results of the regression analysis of the Pahang sample.

In the Pahang sample, the results of the path analysis first indicate a non-significant negative relationship between self-control and smartphone use (β = -.125, p = .076). The second finding reveals a significant positive relationship between emotional dysregulation and smartphone use (β = -.146, p = .038). This suggests that smartphone use may increase with higher levels of individual emotional dysregulation.

The third finding demonstrates a significant positive relationship between smartphone use and nomophobia (β = -.414, p = .000), indicating that higher smartphone usage is associated with

Table 4

Standardized Indirect Effects in the Yogyakarta Sample

Variable	Emotional Dysregulation	Self-control	Emotional Dysregulation	Self-control
	Lower bound		Upper bound	
Smartphone use	.000	.000	.000	.000
Nomophobia	.451	-.279	.684	-.075
Sig.	.003	.003	.003	.003

Table 5

Mean, SD, and Intercorrelation between Variables for the Pahang Sample

	Mean	SD	1	2	3	4
Nomophobia	52.137	16.788	-			
Self-control	52.526	10.394	.097	-		
Emotional dysregulation	20.459	4.719	.260	.241	-	
Smartphone use	16.227	5.207	.428	-.090	.116	-

p < .05*; p < .00**

Table 6

Regression Analysis for Determinant Variables for Nomophobia (Pahang Sample)

	R	Adj. R	df	F	B	β	t	p
Self-control	.485	.224	3	21.234	0.143	.088	1.400	.163
Emotional dysregulation					0.681	.191	3.024	.003
Smartphone use					1.333	.414	6.708	.000

increased nomophobia. The fourth finding shows a non-significant relationship between self-control and nomophobia (β = -.088, p = .159), suggesting that self-control is not significantly related to the level of nomophobia.

Finally, the fifth finding indicates a significant positive relationship between emotional dysregulation and nomophobia (β = .191, p = .002). This implies that an increase in emotional dysregulation correlates with an increase in individual nomophobia. Figure 2 illustrates the path analysis model of the Pahang sample.

Mediating Test on the Pahang Sample

We examined the mediating effect of smartphone use through bootstrapping in a path analysis. In the Pahang sample, it is evident that smartphone use does not mediate the relationship between emotional dysregulation and, self-control, and nomophobia. Table 7 presents evidence that smartphone use does not significantly act as a mediator. Specifically, emotional dysregulation shows a non-significant positive indirect effect on nomophobia, with lower and upper bounds of 0.002 and 0.131 respectively, and a p-value of .089. Similarly, self-control demonstrates a negative indirect effect on nomophobia, with lower and upper bounds of -.131 and .006, respectively, and a p-value = .145. This suggests that smartphone use does not mediate the impact of emotional dysregulation or self-control on nomophobia.

Figure 2

Path Analysis Model of the Pahang Sample
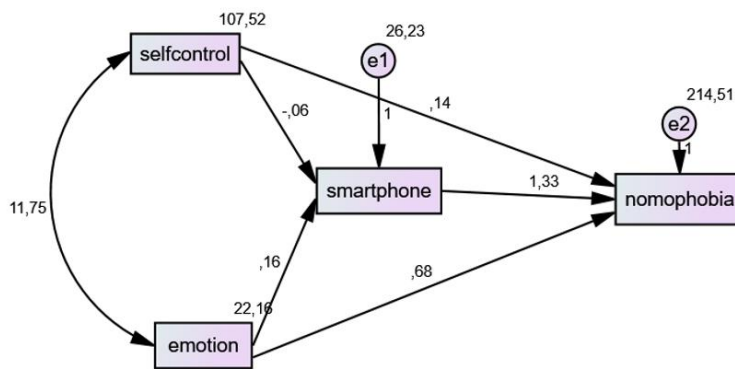
Table 7

Standardized Indirect Effects in the Pahang Sample

Variable	Emotional Dysregulation	Self-control	Emotional Dysregulation	Self-control
	Lower bound		Upper bound	
Smartphone use	.000	.000	.000	.000
Nomophobia	.002	-.131	.131	.006
Sig.	.089	.145	.089	.145

Discussion

The purpose of this research is to confirm the cross-national applicability of the nomophobia model. It focuses on university student samples from Yogyakarta, Indonesia, and Pahang, Malaysia. The study also aims to explore differences in self-control, emotional dysregulation, smartphone use, and levels of nomophobia between Indonesian and Malaysian student samples.

In both Indonesia and Malaysia, students are early adopters of communication technology advancements, especially those provided by smartphones (Lee, 2014). Social media and internet technology have become a crucial part of students' lives, not only for entertainment purposes but also for academic tasks (Winskel et al., 2019).

The initial study findings indicate that Pahang students have a higher smartphone usage level than those in Yogyakarta. This is evident in frequency and duration, with Malaysian students showing higher smartphone usage than their Indonesian counterparts. On average, Malaysians spend around 7.5 hours on the internet and 2.45 hours on social media daily, while Indonesians, on average, spend 7 hours 42 minutes daily on the internet, with an additional average of 3 hours 18 minutes dedicated to social media (Statista, 2020). This is supported by a meta-analysis study conducted by Olson et al. (2022), which identified Malaysia as the third-ranked country in smartphone addiction after China and Saudi Arabia. According to another study by Lee et al. (2023), four out of ten teenagers in Malaysia are addicted to smartphones. Furthermore, an HPUS

2021 survey, which included interviews with 1,916 participants through an online questionnaire revealed a record-breaking smartphone user penetration rate of 94.8% in 2021. Key everyday activities included text messaging (82.9%), social networking (78.9%), voice calls (78.6%) and video calls (71.0%). In contrast, shopping (41.1%) and banking (38.9%) ranked as the least frequently performed daily tasks (Malaysian Communications and Multimedia Commission, 2021).

Our research found that Pahang students (M = 52.137) have a higher level of nomophobia compared to Yogyakarta ones (M = 37.023). This is directly related to the higher use of smartphones among Pahang students. Additionally, several previous studies have found a significant and strong positive relationship between the frequency and duration of smartphone usage and nomophobia (Ayar et al., 2018; Dasgupta et al., 2017; Kaviani et al., 2020; Moreno-Guerrero et al., 2020; Rodríguez-García et al., 2020; Yildirim et al., 2016). According to the operant conditioning theory, the frequency and duration of smartphone usage are associated with the experience of pleasure and reward (Dragoi & Staddon, 1999; Skinner, 1984, 1985). The theory suggests that behaviors resulting in pleasure are more likely to be repeated (Gatzounis et al., 2012; Kirsch et al., 2004). However, the repetition of such behavior may lead to dependence and addiction (Dragoi, 1997; Dragoi & Staddon, 1999; Kirsch et al., 2004; Skinner, 1984). As individuals seek to experience the same pleasure continually, the pattern eventually transforms into obsessive and addictive behavior.

Regarding the self-control variable, it was found that students from Pahang (M = 52.53) had a higher level than those from Yogyakarta (M = 35.16). One factor that may contribute to this high level is the influence of Islamic values and teachings (Abdullah, 1992). In Islam, the values of repentance and self-control play a crucial role. The

students from Pahang might exhibit a higher level of self-control due to the emphasis on values such as patience, self-discipline, and remorse for wrongdoing in Islamic teachings. Awareness of accountability to Allah and the desire for self-improvement can motivate individuals to have better self-control.

The Malaysian students may also have a more robust understanding of how Islamic values play a role in maintaining their self-control in various situations. Additionally, Islam teaches values of virtue, morality, and ethics in everyday behavior. Those who adhere to these principles may have better self-control when facing challenging situations or temptations that arise (Abdullah, 1992).

Another interesting finding from the regression analysis results is the discovery of similar outcomes between the regression models for Pahang and Yogyakarta. In both samples, emotional dysregulation and smartphone use significantly predict nomophobia. However, self-control does not make a significant contribution to it. Subsequently, the researchers conducted path analysis in both samples. The path analysis results showed different outcomes. In the Yogyakarta sample, self-control positively correlates with smartphone use but not significantly with nomophobia. On the other hand, in the Pahang sample, it was found that self-control does not have a significant correlation with either smartphone use or nomophobia. A similar finding from the path analysis results from the Yogyakarta and Pahang samples is the significant positive correlation between emotional dysregulation, smartphone use, and nomophobia. Additionally, smartphone use is positively correlated with nomophobia.

Based on the regression analysis and path analysis, emotional dysregulation and smartphone use consistently play a significant role in nomophobia in both samples. However, in the Yogyakarta sample, smartphone use emerges as the sole significant mediator of the influence of

self-control and emotional dysregulation on nomophobia. This suggests that cultural factors may influence the relationship between variables significantly. Interventions targeting the reduction of nomophobia among students should incorporate the roles of emotional regulation and smartphone use as pivotal factors.

In line with the self-regulation deficit model, individuals with insufficient self-regulation skills are prone to encountering adverse emotions, such as stress or anxiety (Bian & Leung, 2015). Moreover, they are inclined to partake in activities offering immediate satisfaction, such as substance use or excessive reliance on technology. While these behaviors may provide momentary relief from negative emotions, they ultimately result in unfavorable outcomes, encompassing social, financial, and health-related issues (Tangney et al., 2004).

The significant role of emotional dysregulation in relation to nomophobia aligns with several previous studies. The study conducted by Vonasch et al. (2016) revealed that heightened susceptibility to addiction, specifically to substances such as alcohol or drugs, was linked to deficient self-regulation abilities. Similarly, another investigation by Billieux et al. (2008) found an association between poor self-regulation abilities and an elevated risk of developing problematic internet use. Further research has indicated that individuals grappling with addiction display altered neural circuitry in brain regions crucial for self-regulation, such as the prefrontal cortex and the striatum (Koob & Volkow, 2010). These neurological changes may contribute to challenges in managing emotions and impulses, thereby increasing vulnerability to addictive behaviors. Furthermore, studies have demonstrated that interventions focusing on enhancing self-regulation skills, encompassing emotion regulation and impulse control, can effectively mitigate addictive behaviors and problematic smartphone use. For instance,

mindfulness-based interventions have been proven to enhance emotion regulation and reduce substance use in individuals dealing with addiction (Garland et al., 2019).

The intensity of smartphone usage was identified in this research as having a significant and robust impact on nomophobia. The findings align with previous research, indicating a consistent connection between the frequency and duration of smartphone use and the presence of nomophobia (Arpaci et al., 2019; Dongre et al., 2017; Kara et al., 2021; Yildiz Durak, 2019). It is emphasized that longer durations of smartphone usage are associated with a heightened tendency toward nomophobia. Additionally, increased smartphone usage frequency is linked to a more substantial likelihood of experiencing the condition (Dongre et al., 2017; Kara et al., 2021). Notably, the research highlights the adverse effects of excessive smartphone use, including diminished academic achievement and work productivity (Ozdemir et al., 2018), heightened dependence on smartphones (Gutiérrez-Puertas et al., 2019); and increased distractions during academic learning and laboratory practicum activities (Aguilera-Manrique et al., 2018; Mendoza et al., 2018).

This research contributes theoretical advancements in understanding nomophobia by extending its model to encompass cross-national applicability and cultural variations in smartphone usage patterns among university students. By integrating cultural factors into the nomophobia model, scholars can gain deeper insights into how socio-cultural contexts influence individuals' technological relationships and subsequent anxiety levels. The study also underscores the pivotal role of emotional dysregulation in predicting nomophobia, irrespective of cultural background, highlighting the significance of emotional regulation within the framework of technology-related anxiety. Additionally, identifying smartphone usage as a mediating factor in the relationship between emotional

dysregulation and nomophobia adds nuance to existing theoretical perspectives, emphasizing the dynamic interplay between psychological factors and behavioral patterns.

It should be noted that our investigation employed a cross-sectional design, thus limiting the ability to establish causality or the directionality of relationships between the variables. To address this limitation, longitudinal studies tracking individuals over time could shed light on the temporal connections between these variables and nomophobia. In addition, using purposive sampling to recruit participants may not render a sample representative of the broader population of interest. Therefore, future research should consider employing a probabilistic sampling method, such as random sampling or stratified random sampling, to enhance the generalizability of the findings. In conclusion, further research is essential to understand the intricate relationships between emotional dys-regulation, self-control, and nomophobia. More-over, investigating potential mediators and moderators of these relationships would contribute to a more comprehensive under-standing of the subject matter.

The study findings have practical implications for developing targeted intervention strategies to reduce nomophobia among university students. Given the cultural differences in smartphone usage patterns and nomophobia levels, tailored intervention approaches are warranted, which take into account specific cultural norms and values surrounding technology use. Educational programs designed to enhance emotional regulation skills, such as mindfulness-based techniques or cognitive-behavioral strategies, can be effective in mitigating smartphone-related anxiety. Moreover, promoting healthy technology habits within educational institutions and policymaking circles, including digital literacy programs and initiatives encouraging digital detox practices, is crucial for fostering balanced technology use and student well-being.

In summary, this research contributes theoretically and practically to understanding and managing nomophobia. By addressing the intricate interplay between emotional regulation, smartphone usage patterns, and cultural factors, scholars and practitioners can work towards developing culturally sensitive interventions that promote healthier relationships with technology and enhance the well-being of university students across diverse cultural contexts.

Conclusion

In conclusion, the research provides valuable insights into the prevalence and correlates of nomophobia among university students in Yogyakarta, Indonesia, and Pahang, Malaysia. By confirming the cross-national applicability of the nomophobia model and identifying significant differences in smartphone usage patterns between the two samples, the study sheds light on the cultural and contextual factors influencing technology-related anxiety. Based on the analysis results, it is evident that there are notable differences in the levels of nomophobia, self-control, and smartphone use between Indonesian and Malaysian students. Specifically, Malaysia exhibits a significantly higher mean value for nomophobia than Indonesia, indicating a greater prevalence of nomophobia among Malaysian students. This discrepancy is further supported by the substantial effect size ($\eta^2 pv$ = .263), highlighting the significance of this finding.

Similarly, Malaysia demonstrates a notably higher level of self-control than Indonesia students, with a substantial effect size (η^2 = .538). This suggests that Malaysian students tend to exhibit greater self-control than their Indonesian counterparts.

However, when considering emotional dysregulation, the difference between Indonesia and Malaysia is not statistically significant. Both countries show similar mean values, implying

comparable levels of emotional dysregulation among students from both nations.

Regarding smartphone use, Malaysia again displays a higher frequency compared to Indonesia, indicating a greater reliance on them among Malaysian students. While the effect size is smaller compared to nomophobia and self-control ($\eta^2 = .131$), it still suggests a meaningful difference between the two countries in terms of smartphone usage patterns.

In conclusion, the analysis underscores the importance of recognizing and addressing the differences in nomophobia, self-control and smartphone use between Indonesia and Malaysia. The findings could inform tailored interventions to mitigate nomophobia and promote healthier smartphone usage habits among students in both countries. Additionally, the absence of a significant difference in emotional dysregulation highlights a potential area of similarity that could be explored further in cross-cultural studies.

The findings highlight the crucial role of emotional dysregulation in predicting nomo-phobia across both samples, underscoring the importance of addressing emotional regulation in interventions aimed at reducing smartphone-related anxiety among students. Moreover, the study highlights the mediating role of smartphone usage in the relationship between emotional dysregulation and nomophobia, suggesting the universal significance of smartphone usage patterns in influencing technology-related anxiety levels. Notably, the research emphasizes the adverse effects of excessive smartphone use, including diminished academic achievement and increased dependence on such devices, under-lining the pressing need for interventions to promote healthier technology habits among university students. Ultimately, the study contributes to our understanding of nomophobia and its correlates, providing valuable insights for developing targeted interventions to address smartphone-related anxiety in diverse cultural contexts.[]

Author Contribution Statement

Triantoro Safari: Conceptualization; Data Curation; Formal Analysis; Funding Acquisition; Investigation; Methodology; Project Administration; Resources; Validation; Visualization; Writing Original Draft; Writing, Review & Editing. **Muhammad Nubli Abdul Wahab:** Data Curation; Funding Acquisition; Investigation; Resources; Writing, Review & Editing. **Hadi Suyono:** Data Curation; Investigation; Writing, Review & Editing. **Dody Hartanto:** Data Curation; Investigation; Writing Original Draft.

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Informed Consent

All informants agreed to participate in this study and signed a voluntary informed consent statement. The anonymity and confidentiality of all participants were guaranteed.

References

Abdullah, A. (1992). The influence of ethnic values on managerial practices in Malaysia. *Malaysian Management Review*, *27*(1), 3–18.

Adawi, M., Zerbetto, R., Re, T. S., Bisharat, B., Mahamid, M., Amital, H., Del Puente, G., & Bragazzi, N. L. (2019). Psychometric properties of the Brief Symptom Inventory in nomophobic subjects: Insights from preliminary confirmatory factor, exploratory factor, and clustering analyses in a sample of healthy Italian volunteers. *Psychology Research and Behavior Management*, *12*, 145–154. https://doi.org/10.2147/PRBM.S173282

Adler, N. E. (2015). Disadvantage, self-control, and health. *Proceedings of the National Academy of Sciences*, *112*(33), 10078–10079. https://doi.org/10.1073/pnas.1512781112

Aguilera-Manrique, G., Márquez-Hernández, V. V., Alcaraz-Córdoba, T., Granados-Gámez, G., Gutiérrez-Puertas, V., & Gutiérrez-Puertas, L. (2018). The relationship between nomophobia and the distraction associated with smartphone use among nursing students in their clinical practicum. *Plos One*, *13*(8), e0202953. https://doi.org/10.1371/journal.pone.0202953

Akyol Guner, T., & Demir, I. (2022). Relationship between smartphone addiction and nomophobia, anxiety, self-control in high school students. *Addicta: The Turkish Journal on Addictions*, *9*(2), 218–224. https://doi.org/10.5152/addicta.2021.21089

Ali, A., Muda, M., Ridzuan, A. R., Nuji, M. N. N., Izzamuddin, M. H. M., & Latiff, D. I. A. (2017). The relationship between phone usage factors and nomophobia. *Advanced Science Letters*, *23*(8), 7610–7613. https://doi.org/10.1166/asl.2017.9534

Argumosa-Villar, L., Boada-Grau, J., & Vigil-Colet, A. (2017). Exploratory investigation of theoretical predictors of nomophobia using the Mobile Phone Involvement Questionnaire (MPIQ). *Journal of Adolescence*, *56*(1), 127–135. https://doi.org/10.1016/j.adolescence.2017.02.003

Arpaci, I., Baloğlu, M., & Kesici, Ş. (2019). A multi-group analysis of the effects of individual differences in mindfulness on nomophobia. *Information Development*, *35*(2), 333–341. https://doi.org/10.1177/0266666917745350

Arpaci, I., Baloğlu, M., Özteke Kozan, H. İ., & Kesici, Ş. (2017). Individual differences in the relationship between attachment and nomophobia among college students: The mediating role of mindfulness. *Journal of Medical Internet Research*, *19*(12), e404. https://doi.org/10.2196/jmir.8847

Ayar, D., Özalp Gerçeker, G., Özdemir, E. Z., & Bektaş, M. (2018). The effect of problematic internet use, social appearance anxiety, and social media use on nursing students' nomophobia levels. *CIN: Computers, Informatics, Nursing*, *36*(12), 589–595. https://doi.org/10.1097/CIN.0000000000000458

Baumeister, R. F., Vohs, K. D., & Tice, D. M. (2007). The strength model of self-control. *Current Directions in Psychological Science*, *16*(6), 351–355. https://doi.org/10.1111/j.1467-8721.2007.00534.x

Bekaroğlu, E., & Yılmaz, T. (2020). Nomophobia: Differential diagnosis and treatment. *Psikiyatride Guncel Yaklasimlar*, *12*(1), 131–142.

Berry, J. W. (2002). *Cross-cultural psychology: Research and applications*. Cambridge University Press.

Bhattacharya, S., Bashar, M., Srivastava, A., & Singh, A. (2019). Nomophobia: No mobile phone phobia. *Journal of Family Medicine and Primary Care*, *8*(4), 1297. https://doi.org/10.4103/jfmpc.jfmpc_71_19

Bian, M., & Leung, L. (2015). Linking loneliness, shyness, smartphone addiction symptoms, and patterns of smartphone use to social capital. *Social Science Computer Review*, *33*(1), 61–79. https://doi.org/10.1177/0894439314528779

Billieux, J., Van der Linden, M., & Rochat, L. (2008). The role of impulsivity in actual and problematic use of the mobile phone. *Applied Cognitive Psychology*, *22*(9), 1195–1210. https://doi.org/10.1002/acp.1429

Cameron, L. D., & Overall, N. C. (2018). Suppression and expression as distinct emotion-regulation processes in daily interactions: Longitudinal and meta-analyses. *Emotion*, *18*(4), 465–480. https://doi.org/10.1037/emo0000334

Darvishi, M., Noori, M., Nazer, M. R., Sheikholeslami, S., & Karimi, E. (2019). Investigating different dimensions of nomophobia among medical students: A cross-sectional study. *Open Access Macedonian Journal of Medical Sciences*, *7*(4), 573–578. https://doi.org/10.3889/oamjms.2019.138

Dasgupta, P., Bhattacherjee, S., Dasgupta, S., Roy, J., Mukherjee, A., & Biswas, R. (2017). Nomophobic behaviors among smartphone using medical and engineering students in two colleges of West Bengal. *Indian Journal of Public Health*, *61*(3), 199. https://doi.org/10.4103/ijph.IJPH_81_16

Dixit, S., Shukla, H., Bhagwat, A., Bindal, A., Goyal, A., Zaidi, A., & Shrivastava, A. (2010). A study to evaluate mobile phone dependence among students of a medical college and associated hospital of central India. *Indian Journal of Community Medicine*, *35*(2), 339. https://doi.org/10.4103/0970-0218.66878

Dongre, A. S., Inamdar, I. F., & Gattani, P. L. (2017). Nomophobia: A study to evaluate mobile phone dependence and impact of cell phone on health. *National Journal of Community Medicine*, *8*(11), 688–693. https://www.njcmindia.com/index.php/file/article/view/1650

Dragoi, V. (1997). A dynamic theory of acquisition and extinction in operant learning. *Neural Networks*, *10*(2), 201–229. https://doi.org/10.1016/S0893-6080(96)00067-6

Dragoi, V., & Staddon, J. E. R. (1999). The dynamics of operant conditioning. *Psychological Review*, *106*(1), 20–61. https://doi.org/10.1037/0033-295X.106.1.20

Gao, Q., Fu, E., Xiang, Y., Jia, G., & Wu, S. (2021). Self-esteem and addictive smartphone use: The mediator role of anxiety and the moderator role of self-control. *Children and Youth Services Review*, *124*, 105990. https://doi.org/10.1016/j.childyouth.2021.105990

Garland, E. L., Hanley, A. W., Riquino, M. R., Reese, S. E., Baker, A. K., Salas, K., Yack, B. P., Bedford, C. E., Bryan, M. A., Atchley, R., Nakamura, Y., Froeliger, B., & Howard, M. O. (2019). Mindfulness-oriented recovery enhancement reduces opioid misuse risk via analgesic and positive psychological mechanisms: A randomized controlled trial. *Journal of Consulting and Clinical Psychology*, *87*(10), 927–940. https://doi.org/10.1037/ccp0000390

Gatzounis, R., Schrooten, M. G. S., Crombez, G., & Vlaeyen, J. W. S. (2012). Operant learning theory in pain and chronic pain rehabilitation. *Current Pain and Headache Reports*, *16*(2), 117–126. https://doi.org/10.1007/s11916-012-0247-1

Geertz, C. (1960). *The Religion of Java*. The Free Press.

Gross, J. J. (1999). Emotion regulation: Past, present, future. *Cognition & Emotion*, *13*(5), 551–573. https://doi.org/10.1080/026999399379186

Gross, J. J., Richards, J. M., & John, O. P. (2006). Emotion regulation in everyday life. In *Emotion regulation in couples and families: Pathways to dysfunction and health.* (pp. 13–35). American Psychological Association. https://doi.org/10.1037/11468-001

Gruber, J., Mauss, I. B., & Tamir, M. (2011). A dark side of happiness? How, when, and why happiness is not always good. *Perspectives on Psychological Science*, *6*(3), 222–233. https://doi.org/10.1177/1745691611406927

Gutiérrez-Puertas, L., Márquez-Hernández, V. V., São-Romão-Preto, L., Granados-Gámez, G., Gutiérrez-Puertas, V., & Aguilera-Manrique, G. (2019). Comparative study of nomophobia among Spanish and Portuguese nursing students. *Nurse Education in Practice*, *34*, 79–84. https://doi.org/10.1016/j.nepr.2018.11.010

Hamutoglu, N. B., Gezgin, D. M., Sezen-Gultekin, G., & Gemikonakli, O. (2018). 10.18844/cjes.v13i4.3464. *Cypriot Journal of Educational Sciences*, *13*(4), 549–561. https://doi.org/10.18844/cjes.v13i4.3464

Hernández, A., Hidalgo, M. D., Hambleton, R. K., & Gómez-Benito, J. (2020). International Test Commission guidelines for test adaptation: A criterion checklist. *Psicothema*, *32*(3), 390–398. https://doi.org/10.7334/psicothema2019.306

Jahrami, H., Trabelsi, K., Boukhris, O., Hussain, J. H., Alenezi, A. F., Humood, A., Saif, Z., Pandi-Perumal, S. R., & Seeman, M. V. (2023). The prevalence of mild, moderate, and severe nomophobia symptoms: A systematic review, meta-analysis, and meta-regression. *Behavioral Sciences*, *13*(1), 35. https://doi.org/10.3390/bs13010035

Kara, M., Baytemir, K., & Inceman-Kara, F. (2021). Duration of daily smartphone usage as an antecedent of nomophobia: exploring multiple mediation of loneliness and anxiety. *Behaviour & Information Technology*, *40*(1), 85–98. https://doi.org/10.1080/0144929X.2019.1673485

Kaur, A., Sharma, P., & Manu. (2015). A descriptive study to assess the risk of developing nomophobia among students of selected nursing colleges Ludhiana, Punjab. *International Journal of Psychiatric Nursing*, *1*(2), 1. https://doi.org/10.5958/2395-180X.2015.00051.1

Kaviani, F., Robards, B., Young, K. L., & Koppel, S. (2020). Nomophobia: Is the fear of being without a smartphone associated with problematic use? *International Journal of Environmental Research and Public Health*, *17*(17), 6024. https://doi.org/10.3390/ijerph17176024

King, A. L. S., Valença, A. M., & Nardi, A. E. (2010). Nomophobia: The mobile phone in panic disorder with agoraphobia. *Cognitive and Behavioral Neurology*, *23*(1), 52–54. https://doi.org/10.1097/WNN.0b013e3181b7eabc

King, A. L. S., Valença, A. M., Silva, A. C. O., Baczynski, T., Carvalho, M. R., & Nardi, A. E. (2013). Nomophobia: Dependency on virtual environments or social phobia? *Computers in Human Behavior*, *29*(1), 140–144. https://doi.org/10.1016/j.chb.2012.07.025

King, A. L. S., Valença, A. M., Silva, A. C., Sancassiani, F., Machado, S., & Nardi, A. E. (2014). "Nomophobia": Impact of cell phone use interfering with symptoms and emotions of individuals with panic disorder compared with a control group. *Clinical Practice and Epidemiology in Mental Health: CP & EMH*, *10*, 28.

Kirsch, I., Lynn, S. J., Vigorito, M., & Miller, R. R. (2004). The role of cognition in classical and operant conditioning. *Journal of Clinical Psychology*, *60*(4), 369–392. https://doi.org/10.1002/jclp.10251

Koob, G. F., & Volkow, N. D. (2010). Neurocircuitry of addiction. *Neuropsychopharmacology*, *35*(1), 217–238. https://doi.org/10.1038/npp.2009.110

Lee, S., Kim, M., Mendoza, J. S., & McDonough, I. M. (2018). Addicted to cellphones: exploring the psychometric properties between the nomophobia questionnaire and obsessiveness in college students. *Heliyon*, *4*(11), e00895. https://doi.org/10.1016/j.heliyon.2018.e00895

Lee, S. Y. (2014). Examining the factors that influence early adopters' smartphone adoption: The case of college students. *Telematics and Informatics*, *31*(2), 308–318. https://doi.org/10.1016/j.tele.2013.06.001

Lee, Y.-S., Yang, H.-S., Jeong, C.-J., Yoo, Y.-D., Jeong, G.-Y., Moon, J.-S., Kang, M.-K., & Hong, S.-W. (2012). Changes in the thickness of median nerves due to excessive use of smartphones. *Journal of Physical Therapy Science*, *24*(12), 1259–1262. https://doi.org/10.1589/jpts.24.1259

Leung, K. (1989). Cross-cultural differences: individual-level vs. cultural-level. *International Journal of Psychology*, *24*(6), 703–719. https://doi.org/10.1080/00207598908247840

Liu, W., Chen, J.-S., Gan, W. Y., Poon, W. C., Tung, S. E. H., Lee, L. J., Xu, P., Chen, I.-H., Griffiths, M. D., & Lin, C.-Y. (2022). Associations of problematic internet use, weight-related self-stigma, and nomophobia with physical activity: Findings from mainland China, Taiwan, and Malaysia. *International Journal of Environmental Research and Public Health*, *19*(19), 12135. https://doi.org/10.3390/ijerph191912135

Madden, C. (2005). Cross-country comparisons of cultural statistics: Issues and good practice. *Cultural Trends*, *14*(4), 299–316. https://doi.org/10.1080/09548960600573559

Malaysian Communications and Multimedia Commission. (2021). *Handphone users survey 2021 (HPUS 2021)*.

Mauss, I. B., Evers, C., Wilhelm, F. H., & Gross, J. J. (2006). How to bite your tongue without blowing your top: Implicit evaluation of emotion regulation predicts affective responding to anger provocation. *Personality and Social Psychology Bulletin*, *32*(5), 589–602. https://doi.org/10.1177/0146167205283841

Mendoza, J. S., Pody, B. C., Lee, S., Kim, M., & McDonough, I. M. (2018). The effect of cellphones on attention and learning: The influences of time, distraction, and nomophobia. *Computers in Human Behavior*, *86*, 52–60. https://doi.org/10.1016/j.chb.2018.04.027

Moreno-Guerrero, A.-J., López-Belmonte, J., Romero-Rodríguez, J.-M., & Rodríguez-García, A.-M. (2020). Nomophobia: impact of cell phone use and time to rest among teacher students. *Heliyon*, *6*(5), e04084. https://doi.org/10.1016/j.heliyon.2020.e04084

Musa, R., Saidon, J., & Rahman, S. A. (2017). Who's at risk for smartphone nomophobia and pathology; The young or matured urban millennials? *Advanced Science Letters*, *23*(8), 7486–7489. https://doi.org/10.1166/asl.2017.9504

Olson, J. A., Sandra, D. A., Colucci, É. S., Al Bikaii, A., Chmoulevitch, D., Nahas, J., Raz, A., & Veissière, S. P. L. (2022). Smartphone addiction is increasing across the world: A meta-analysis of 24 countries. *Computers in Human Behavior*, *129*, 107138. https://doi.org/10.1016/j.chb.2021.107138

Ozdemir, B., Cakir, O., & Hussain, I. (2018). Prevalence of nomophobia among university students: A comparative study of Pakistani and Turkish undergraduate students. *EURASIA Journal of Mathematics, Science and Technology Education*, *14*(4). https://doi.org/10.29333/ejmste/84839

Parrott, W. G. (1993). Beyond hedonism: Motives for inhibiting good moods and for maintaining bad moods. In *Handbook of Mental Control* (pp. 278–305). Prentice-Hall, Inc.

Rodríguez-García, A.-M., Moreno-Guerrero, A.-J., & López Belmonte, J. (2020). Nomophobia: An individual's growing fear of being without a smartphone—A systematic literature review. *International Journal of Environmental Research and Public Health*, *17*(2), 580. https://doi.org/10.3390/ijerph17020580

Salovey, P., Mayer, J. D., Caruso, D., & Yoo, S. H. (2009). The positive psychology of emotional intelligence. In S. J. Lopez & C. R. Snyder (Eds.), *The Oxford Handbook of Positive Psychology* (pp. 236–248). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780195187243.013.0022

SecurEnvoy. (2012). 66% of the population suffer from nomophobia the fear of being without their phone. *SecurEnvoy*. https://securenvoy.com/blog/66-population-suffer-nomophobia-fear-being-without-their-phone-2/.

Servidio, R. (2021). Self-control and problematic smartphone use among Italian University students: The mediating role of the fear of missing out and of smartphone use patterns. *Current Psychology*, *40*(8), 4101–4111. https://doi.org/10.1007/s12144-019-00373-z

Skinner, B. F. (1984). The evolution of behavior. *Journal of the Experimental Analysis of Behavior, 41*(2), 217–221. https://doi.org/10.1901/jeab.1984.41-217

Skinner, B. F. (1985). Cognitive science and behaviourism. *British Journal of Psychology, 76*(3), 291–301. https://doi.org/10.1111/j.2044-8295.1985.tb01953.x

Statista. (2020). *Smartphone users in Malaysia 2010-2025*. Statista Research Department.

Statista. (2023a). *Smartphone market in Indonesia - Statistics and facts*. Statista Research Department.

Statista. (2023b). *Smartphone market in Malaysia - statistics and facts.* Statista Research Department.

Sutarto, A. (2006). Becoming a true Javanese: A Javanese view of attempts at Javanisation. *Indonesia and the Malay World, 34*(98), 39–53. https://doi.org/10.1080/13639810600650893

Tams, S., Legoux, R., & Léger, P.-M. (2018). Smartphone withdrawal creates stress: A moderated mediation model of nomophobia, social threat, and phone withdrawal context. *Computers in Human Behavior, 81*, 1–9. https://doi.org/10.1016/j.chb.2017.11.026

Tangney, J. P., Baumeister, R. F., & Boone, A. L. (2004). High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. *Journal of Personality, 72*(2), 271–324. https://doi.org/https://doi.org/10.1111/j.0022-3506.2004.00263.x

Vohs, K. D., & Faber, R. J. (2007). Spent resources: Self-regulatory resource availability affects impulse buying. *Journal of Consumer Research, 33*(4), 537–547. https://doi.org/10.1086/510228

Vonasch, A. J., Maranges, H. M., & Baumeister, R. F. (2016). Self-regulation, controlled processes, and the treatment of addiction. In *Addiction and Choice* (pp. 286–304). Oxford University Press. https://doi.org/10.1093/acprof:oso/9780198727224.003.0016

Walton, S. P. (2008). Aesthetic and spiritual correlations in Javanese gamelan music. *Journal of Aesthetics and Art Criticism, 65*(1), 31–41. https://doi.org/10.1111/j.1540-594X.2007.00235.x

Webb, T. L., Lindquist, K. A., Jones, K., Avishai, A., & Sheeran, P. (2018). Situation selection is a particularly effective emotion regulation strategy for people who need help regulating their emotions. *Cognition and Emotion, 32*(2), 231–248. https://doi.org/10.1080/02699931.2017.1295922

Wei Lee, K., Mooi Ching, S., Ali, N., Yau Ooi, C., Kamal Hj Sidek, S., Amat, A., Yatim, Y., Yahaya, Z., Shamsuddin, N., Ibrahim, I., Abdul Majid, F., Suhana Othman, F., Suhaila Zakaria, N., Abidin, A., Hazlin Talib, N., & Sivaratnam, D. (2023). Prevalence and factors associated with smartphone addiction among adolescents–A nationwide study in Malaysia. *International Journal of Mental Health Promotion, 25*(2), 237–247. https://doi.org/10.32604/ijmhp.2023.013407

Winskel, H., Kim, T.-H., Kardash, L., & Belic, I. (2019). Smartphone use and study behavior: A Korean and Australian comparison. *Heliyon, 5*(7), e02158. https://doi.org/10.1016/j.heliyon.2019.e02158

Yildirim, C., & Correia, A.-P. (2015). Exploring the dimensions of nomophobia: Development and validation of a self-reported questionnaire. *Computers in Human Behavior*, *49*, 130–137. https://doi.org/10.1016/j.chb.2015.02.059

Yildirim, C., Sumuer, E., Adnan, M., & Yildirim, S. (2016). A growing fear: Prevalence of nomophobia among Turkish college students. *Information Development*, *32*(5), 1322–1331. https://doi.org/10.1177/0266666915599025

Yildiz Durak, H. (2019). Investigation of nomophobia and smartphone addiction predictors among adolescents in Turkey: Demographic variables and academic performance. *The Social Science Journal*, *56*(4), 492–517. https://doi.org/10.1016/j.soscij.2018.09.003

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