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Examining the Role of Sociodemographic Characteristics and Smartphone Usage Patterns on Smartphone Addiction among Foundation Program Students using Multiple Regression Analysis

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ABSTRACT

Smartphones have become an integral part of daily life, especially among young adults who depend on them for communication, entertainment, education, and social interaction. Despite their benefits, growing concerns have emerged regarding excessive and potentially harmful smartphone use, leading to smartphone addiction. These concerns highlight the urgent need to understand the factors contributing to this issue. This study adopts a cross-sectional design to investigate the influence of sociodemographic characteristics and smartphone usage patterns on smartphone addiction. The research involves 404 randomly selected students from the Foundation Program at Universiti Malaysia Sabah. Data are analyzed using Chi-square test, t-test, ANOVA, and multiple regression analysis with SPSS software. The results reveal that 43.3% of the students were classified as addicted to smartphones. Five key factors are identified to significantly contribute to smartphone addiction, namely gender, purpose of use, self-evaluation of addiction, latest time of use, and duration of use before stopping to sleep. These findings can support the development of evidence-based intervention and preventive strategies targeted at young adults. It also offers valuable insights for mental health professionals, educators, and policymakers aiming to promote healthier smartphone habits within this vulnerable population.

1. Introduction

Smartphones have become ubiquitous in individuals' daily lives, especially among young adults. They rely on smartphones for communication, entertainment, education, and social interaction [1-3]. Despite its benefits and advantages, it has been supplemented by increasing concerns over excessive and possibly harmful smartphone use [1,2,4,5]. Emerging evidence underlines behavioral patterns linked with smartphone use that resemble characteristics frequently observed in addiction.

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Smartphone addiction is described as a pattern of excessive smartphone use, characterized by a lack of control, disruption of daily activities, and negative consequences that affect multiple aspects of life for the user [6].

Excessive smartphone use can reduce classroom participation, impair students' focus, and adversely impact their educational performance [7]. It also interrupts sleep patterns, leading to fatigue and diminished cognitive function [5,7]. Furthermore, overuse is associated with depression, anxiety, loneliness, and reduced social and multitasking skills [3,5,7]. It may contribute to impulsive spending, procrastination, and weakened real-world relationships, all of which can hinder both academic and personal development [3,5,7].

These worsening situations underscore the critical need to understand the factors contributing to smartphone addiction, enabling the design of effective interventions and preventive strategies. Among the factors, sociodemographic characteristics such as ethnicity, gender, and socioeconomic status may affect the extent and nature of smartphone use [3,5,8,9]. Age and gender consistently appear as key factors, with younger individuals and males commonly showing a higher risk of problematic smartphone use [10-12]. The age at which children begin using mobile devices has also been shown to significantly influence problematic usage patterns, specifically among young children [8]. Family-related variables such as the number of siblings and family size have been associated with heightened risk, with individuals from larger households exhibiting higher vulnerability to addiction [10,11]. The employment status of individuals and the educational background of parents further contribute to the likelihood of smartphone addiction, implying that broader social and economic conditions play a substantial role [10,11].

Additionally, empirical evidence consistently highlights specific usage patterns as significant predictors of smartphone addiction [5]. Prolonged daily use has been strongly associated with higher levels of addiction, with time spent on smartphones predicting a substantial proportion of variance in addictive behavior among university students and adolescents [5,9,10]. Late-night smartphone usage has been linked to impaired self-regulation and persistent use despite negative consequences, which are hallmark features of behavioral addiction [5]. The intended purpose of smartphone use also plays a critical role; using devices primarily for social media has been found to increase the likelihood of addiction [12], while the specific reasons parents provide smartphones to children can contribute to early problematic use [8]. Furthermore, self-perceived overuse and the functional motivation behind smartphone engagement have been shown to correlate significantly with addictive patterns among adolescents [9]. These findings suggest that both the quantity and quality of smartphone engagement are essential in understanding the development and maintenance of smartphone addiction.

In spite of this growing evidence on the role of sociodemographic characteristics and smartphone usage patterns on smartphone addiction, there is a paucity of research examining their impact among foundation students in Sabah, underscoring the need for region-specific insights to guide targeted interventions. Consequently, to address the gaps in previous studies, the present study is conducted to:

i. To determine the level of smartphone addiction of foundation students.
ii. To examine the difference in smartphone addiction scores based on sociodemographic and smartphone usage patterns.
iii. To identify factors contributing to smartphone addiction scores using sociodemographic and smartphone usage patterns.

This study addresses the rising public health concern of smartphone addiction, specifically among young adults who are deeply engaged in digital technology. As smartphones become increasingly central to communication, learning, and social interaction, identifying the factors that drive excessive use is critical to mitigating its adverse effects on academic performance, mental health, and overall well-being. The significance of this study lies in its examination of how sociodemographic characteristics and smartphone usage patterns may contribute to the risk of addiction. By identifying key predictors across these domains, the study advances the existing body of knowledge on digital dependency and behavioral addiction. The results are expected to assist in the advancement of evidence-based interventions and preventive strategies tailored to young adults. Furthermore, this study may provide valuable guidance for mental health professionals, educators, and policymakers seeking to promote healthier technological practices among this vulnerable population.

2. Methodology

2.1 Study Design and Sample

This research employed a cross-sectional design to investigate the relationship between sociodemographic factors, smartphone usage patterns, and smartphone addiction. This study included Foundation Program students at Universiti Malaysia Sabah, with a randomly selected sample of 404 participants. Apart from enrolment in the program, no additional exclusion or inclusion criteria were imposed.

2.2 Data Collection, Instruments, and Ethical Considerations

This study employed a self-administered questionnaire, and it was divided into three parts. The first part collected sociodemographic information, including gender, program enrollment, place of origin, living arrangements, ethnicity, socioeconomic status, and family structure. The second part consisted of six questions assessing smartphone usage patterns, covering features such as the purpose of use, duration of use, self-assessment of addiction, latest usage time, daily usage time, and smartphone use before sleep. The final part included the Smartphone Addiction Scale – Short Version (SAS-SV) to measure smartphone addiction levels. Data collection adhered to ethical standards, confirming participant confidentiality and data protection. Informed consent was acquired from all participants prior to their involvement in the study.

2.2.1 Smartphone Addiction Scale – Short Version (SAS-SV)

It is a validated instrument comprising ten questions designed to assess smartphone addiction. Participants rate their agreement with statements about their smartphone usage, such as "Using a smartphone longer than intended," using a 6-point Likert scale that ranges from "strongly disagree" (1) to "strongly agree" (6). The total score ranges from 10 to 60, with higher scores indicating a greater risk of smartphone addiction. Diagnostic thresholds are set at 31 for males and 33 for females, as suggested by Sohn *et al.,* [5]. Its construct validity is well-established, and reliability in this sample was high, with a Cronbach's α of 0.827.

2.3 Statistical Analysis

Data analysis was performed using descriptive statistics, Pearson’s chi-square test, independent t-test, analysis of variance (ANOVA), and linear regression. All analyses were conducted with SPSS

software version 29.0. A two-tailed significance level was applied, with *p*-values less than 0.05 considered statistically significant.

2.3.1 Descriptive analysis and Pearson's Chi-Square

The distribution of smartphone addiction among participants based on their sociodemographic characteristics was summarized using frequencies and percentages. Chi-square analysis was employed to examine the relationships between smartphone addiction categories and both sociodemographic factors and smartphone usage patterns.

2.3.2 Independent t-test and Analysis of Variance (ANOVA)

Both analyses were conducted to assess the mean smartphone addiction scores across different sociodemographic groups and smartphone usage patterns. These methods were selected because the data met the assumptions of normality and homogeneity of variances. Only the relevant variables were included in the subsequent regression analysis.

2.3.3 Linear Regression

Simple Linear Regression (SLR) and Multiple Linear Regression (MLR) analyses were conducted to identify predictors of smartphone addiction scores based on sociodemographic characteristics and smartphone usage patterns. SLR was employed to examine the individual influence of each factor, and only significant factors from SLR were retained for the MLR analysis. The general regression equation for multiple factors is represented in Equation (1).

$$Y_i = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \cdots + \beta_j X_{ij} + \varepsilon_i, \quad for\ i = 1,2,3,\dots,n, \qquad j = 1,2,3,\dots,k \tag{1}$$

Y_i is dependent variable (smartphone addiction scores), β_0 signifies regression intercept, β_j is j-th regression coefficients, X_{ij} is the factors (sociodemographic characteristics and smartphone usage patterns), ε_i indicates error term.

Multicollinearity was measured using the tolerance and Variance Inflation Factor (VIF) values. Tolerance values above 0.1 and VIF scores below 10 were indicative of no multicollinearity issues [13]. A goodness-of-fit test was conducted to assess the model's suitability for the data. Additionally, the appropriateness of the model was validated by assessing the normality of residuals through a normal P-P plot and a histogram [14].

3. Results

Table 1 displays the distribution of smartphone addiction among students of the Foundation Program at Universiti Malaysia Sabah, demonstrating their demographic characteristics and their relationships with smartphone addiction. Most of them were in science programs (68.3%) and female (62.4%), with males comprising 37.6% of the sample. Most students were from East Malaysia (86.9%), and almost all of them lived on campus (98.3%). 80.2% of them have a medium socioeconomic status, and 90.6% of the students have both a mother and a father. 43.3% of the students were addicted to smartphones, while 56.7% were not. In examining the relationship between sociodemographic

characteristics and smartphone addiction among foundation students, the present study revealed that demographic characteristics had no significant impact on addiction levels (p>0.05).

Table 1
Sociodemographic characteristics and smartphone addiction

Variables	Total (%)	Smartphone Addition		Chi-square, χ^2Test
		No, n (%)	Yes, n (%)	
1. Foundation Program				
Agriscience	44 (10.9)	26 (6.4)	18 (4.5)	0.285[+]
IT	84 (20.8)	49 (12.1)	35 (8.7)	
Science	276 (68.3)	154 (38.1)	122 (30.2)	
2. Gender				
Male	152 (37.6)	94 (23.3)	58 (14.4)	2.641[+]
Female	252 (62.4)	135 (33.4)	117 (29)	
3. Origin				
East	351 (86.9)	198 (49)	153 (37.9)	0.081[+]
West	53 (13.1)	31 (7.7)	22 (5.4)	
4. Ethnicity				2.013[+]
Chinese	8 (2)	6 (1.5)	2 (0.5)	
Indian	1 (0.2)	1 (0.2)	0 (0)	
Malay	120 (29.7)	69 (17.1)	51 (12.6)	
Others	275 (68.1)	153 (37.9)	122 (30.2)	
5. Living Place				2.293[+]
Off-campus	7 (1.7)	2 (0.5)	5 (1.2)	
In-campus	397 (98.3)	227 (56.2)	170 (42.1)	
6. Socioeconomic Status				0.136[+]
Low	65 (16.1)	36 (8.9)	29 (7.2)	
Medium	324 (80.2)	185 (45.8)	139 (34.4)	
High	15 (3.7)	8 (2)	7 (1.7)	
7. Family Structure				0.763[+]
No-parent	2 (0.5)	1 (0.25)	1 (0.25)	
Parents	366 (90.6)	210 (52.0)	156 (38.6)	
Single Parent	36 (8.9)	18 (4.45)	18 (4.45)	
8. Addiction				
Yes	175 (43.3)	-	-	-
No	229 (56.7)	-	-	-

Note: [+] p-value>0.05

In contrast to sociodemographic factors, specific patterns of smartphone usage were found to be significantly associated with smartphone addiction (p < 0.01, p < 0.001). Key variables included the primary purpose of smartphone use, self-evaluation of addiction, daily usage duration, and the latest time of smartphone use. Students who primarily engaged in web browsing identified themselves as addicted, spent four or more hours per day on their phones, and used their smartphones late into the night (especially at 1 am or later) exhibited higher levels of addiction.

Table 2
Smartphone usage characteristics and smartphone addiction

Variables	Total (%)	Smartphone Addition		Chi-square, χ^2 Test
		No, n (%)	Yes, n (%)	
1. Time Use				0.561^{+}
Weekday	340 (84.2)	190 (47.1)	150 (37.1)	
Weekend	64 (15.8)	39 (9.6)	25 (6.2)	
2. Purpose				13.890***
Communication	154 (38.1)	73 (18.1)	81 (20)	
Entertainment	136 (33.7)	76 (18.8)	60 (14.9)	
Web Browsing	114 (28.2)	80 (19.8)	34 (8.4)	
3. Self-Evaluation				42.838***
Addiction	141 (34.9)	52 (12.9)	89 (22)	
Don't know	136 (33.7)	80 (19.8)	56 (13.9)	
Non-Addiction	127 (31.4)	97 (24)	30 (7.4)	
4. Daily Use				12.306**
$\leq$ 2 hours	14 (3.5)	11 (2.7)	3 (0.7)	
3 hours	59 (14.6)	41 (10.1)	18 (4.5)	
4 hours	84 (20.8)	53 (13.1)	31 (7.7)	
$\geq$ 5 hours	247 (61.1)	124 (30.7)	123 (30.4)	
5. Latest Use				40.067***
Before 11 pm	117 (29)	91 (22.5)	26 (6.4)	
11 pm	64 (15.8)	37 (9.2)	27 (6.7)	
12 am	131 (32.4)	69 (17.1)	62 (15.3)	
1 am or later	92 (22.8)	32 (7.9)	60 (14.9)	
6. Stop Use				1.042^{+}
<30 minute	290 (71.8)	162 (40.1)	128 (31.7)	
30 minute – 1 hour	94 (23.3)	57 (14.1)	37 (9.2)	
>1 hour	20 (5)	10 (2.5)	10 (2.5)	

Note: $^{+}$ *p*-value>0.05, ** *p*-value<0.01, *** *p*-value<0.001

These findings were further supported by the T-test and ANOVA analysis, which confirmed that there were no meaningful differences in smartphone addiction scores across these demographic factors (foundation program, origin, ethnicity, living place, socioeconomic status, family structure) (see Table 3). This alignment between both statistical tests suggests that students' backgrounds or living conditions do not drive addiction. However, one notable exception was gender, which was found to be non-significant in the Chi-square analysis yet demonstrated a statistically significant difference in addiction scores in the T-test ($t = -3.852$, $p < 0.001$), suggesting female students tend to report higher levels of smartphone addiction compared to their male counterparts. This indicates that while addiction rates might not appear different by gender at a categorical level, the actual severity of addiction (measured by scores) is notably higher in one gender group (female).

Contrary to sociodemographic factors, smartphone usage patterns consistently showed strong associations with addiction. These findings were reinforced by the T-test and ANOVA results, where the purpose of use, self-evaluation, daily usage, and latest time of use all demonstrated significant differences in addiction scores. Additionally, the duration of phone use before students stop to sleep was found to be significant in the ANOVA test ($F = 3.980$, $p = 0.019$).

Table 3
Difference in smartphone addiction score

No.	Variables	Smartphone addiction score
1.	Foundation program	F = 0.947, p-value = 0.389
2.	Gender	t = –3.852, p-value <0.001
3.	Origin	t = –0.293, p-value = 0.770
4.	Ethnicity	t = 0.044, p-value = 0.965
5.	Living place	t = 1.952, p-value = 0.052
6.	Socioeconomic status	F = 0.358, p-value = 0.700
7.	Family	t = 0.745, p-value = 0.456
8.	Time use	t = –1.425, p-value = 0.155
9.	Purpose	F = 5.685, p-value = 0.004
10.	Self-evaluation	F = 32.797, p-value <0.001
11.	Daily use	F = 4.3, p-value = 0.005
12.	Latest use	F = 10.082, p-value <0.001
13.	Stop use	F = 3.980, p-value = 0.019

Six factors (gender, purpose, self-evaluation, daily use, latest use, and stop use) were included in the simple linear regression (SLR) analysis, as these variables showed significant results in the t-test and ANOVA. The SLR confirmed that all six factors significantly affected students' smartphone addiction, so they were included in the multiple linear regression (MLR) analysis. Table 4 presents the final results of the MLR, which demonstrate that five variables remain significant predictors of smartphone addiction, highlighting the influence of gender, purpose of use, self-evaluation of addiction, latest time of use, and stop use duration. Daily use was not significant; hence it was excluded from the final model.

Females showed significantly higher addiction scores compared to males (B = 2.593, p = 0.003), indicating that gender plays a role in smartphone dependency. In terms of usage purposes, those who primarily use their phones for communication had higher addiction scores than those who used them mainly for web browsing (B = 3.136, p = 0.003). Self-evaluation also emerged as a strong predictor, with students identifying themselves as addicted scoring 3.59 points higher (p < 0.001), while those considering themselves non-addicted scored 3.69 points lower (p < 0.001) compared to those who were uncertain. Late-night usage was another critical factor; students who used their smartphones at 11 pm, 12 am, and 1 am or later had significantly higher addiction scores, with the highest increase observed for usage at 1 am or later (B = 4.705, p < 0.001). Additionally, students who stopped using their smartphones more than one hour before sleeping had addiction scores that were 5.02 points higher than those who stopped within 30 minutes (p = 0.009). All VIF and tolerance (Tol.) values were well within acceptable limits, indicating no multicollinearity issues. These findings underscore that smartphone addiction is strongly influenced by gender, communication-based use, perceived addiction, late-night usage, and stop use duration.

Table 4
Factors associated with the students' smartphone addiction

Variables	B	*Std. Error*	β	*t*	p	*Tol.*	*VIF*
Constant	22.096	1.840		12.009	<0.001		
Gender							
Male	Reference						
Female	2.593	0.882	0.136	2.941	0.003	0.904	1.106
Purpose							
Web Browsing	Reference						
Communication	3.136	1.031	0.165	3.042	0.003	0.658	1.521
Entertainment	1.313	1.079	0.067	1.217	0.224	0.635	1.576
Self-Evaluation							
Don't know	Reference						
Addiction	3.585	1.025	0.186	3.497	<0.001	0.691	1.448
Non-Addiction	-3.694	1.019	-0.186	-3.624	<0.001	0.737	1.357
Latest Use							
Before 11 pm	Reference						
11 pm	3.108	1.274	0.123	2.439	0.015	0.762	1.313
12 am	3.319	1.049	0.169	3.162	0.002	0.684	1.463
1 am or later	4.705	1.188	0.214	3.960	<0.001	0.664	1.505
Stop Use							
<30 minute	Reference						
30 minutes to 1 hour	-0.912	0.981	-0.042	-0.929	0.353	0.960	1.042
>1 hour	5.018	1.921	0.118	2.612	0.009	0.950	1.053

The results of the MLR showed that the model was significant, F (10, 393) = 12.096, p<0.001, with an adjusted $R^2$of 0.216, indicating that 21.6% of the variance in smartphone addiction was explained by the predictors (gender, purpose of use, self-evaluation of addiction, latest time of use, stop use duration) as shown in Table 5.

Table 5
ANOVA for the multiple regression model

	Sum of Squares	*df*	Mean Square	*F*	*p*-value	$Adj.R^2$
Regression	8060.249	10	806.025	12.096	<0.001	0.216
Residual	26188.867	393	66.638			
Total	34249.116	403				

The normality of the residuals was assessed through a normal P-P plot and a histogram, as illustrated in Figure 1 and Figure 2. The normal P-P plot displays that the plotted points closely follow a straight line, while the histogram exhibits a bell-shaped curve, indicating that the residuals of the models are normally distributed.

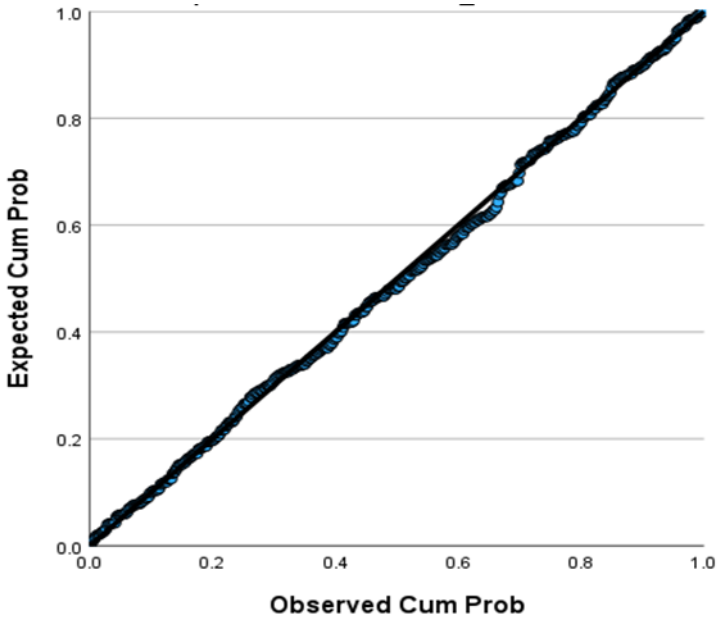

Fig. 1. Normal P-P plot of regression standardized residual

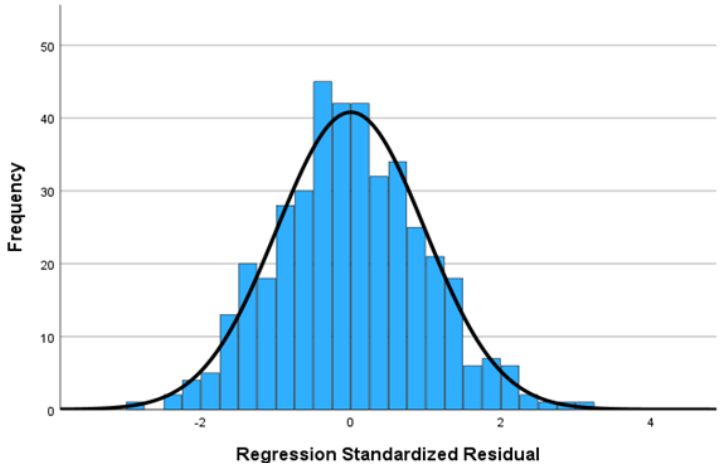

Fig. 2. Histogram of regression standardized residual

4. Discussions

This study examined the prevalence and predictors of smartphone addiction among students in the Foundation Program at Universiti Malaysia Sabah, revealing important findings about the role of demographic and smartphone usage patterns in influencing addiction levels. The findings showed that 43.3% of students were addicted to smartphones, indicating a high prevalence of problematic smartphone use within this population. This prevalence was slightly lower than that reported among dental students in Malaysia (47.9%) [12] and young adults in Bangladesh (61.4%) [11] but higher than the global average (26.9%) [11] and young adults at a university in the United Kingdom (38.9%) [5].

Despite expectations that students' sociodemographic characteristics might contribute to this phenomenon, sociodemographic variables such as region of origin, program of study, ethnicity, socioeconomic status, living arrangement, and family structure showed no significant relationship with smartphone addiction. Both the Chi-square and ANOVA analyses confirmed that these sociodemographic factors did not significantly affect addiction levels, indicating that smartphone addiction among students was not necessarily a consequence of their background or environment. Similarly, studies by Abdullah *et al.,* [8], Ghosh *et al.,* [15], Lee *et al.,* [16], Ratan *et al.,* [11], and Said

et al., [12] found that socioeconomic status was not a contributing factor to smartphone addiction. In addition, Lee *et al.,* [16] and Said *et al.,* [12] reported that neither ethnicity nor family structure had a significant effect on students' levels of smartphone addiction.

Gender, however, appeared to be a notable exception. It was identified as a statistically significant predictor of addiction severity in the T-test, and this effect remained significant in the multiple linear regression analysis, indicating that female students tend to exhibit higher levels of smartphone addiction. This finding aligns with previous studies that also reported a significant association between gender and smartphone addiction [8,11,12,17]. However, unlike the present study, most of these studies found that male students were generally at higher risk of problematic smartphone use.

In contrast to the minimal influence of demographic factors, smartphone usage characteristics were consistently significant predictors of addiction. Across all analyses, the purpose of smartphone use emerged as a key factor. Students who used their smartphones primarily for communication had significantly higher addiction scores than those who used them mainly for web browsing. This finding was aligned with the findings by Nasution *et al.,* [17] and Said *et al.,* [12], who reported that using smartphones for social media significantly increases the risk of addiction. These results suggest that the social and interactive functions of smartphones may drive more compulsive usage patterns. This may be particularly relevant to young adults, a group for whom social networking is a central aspect of smartphone use [12].

Moreover, students who identified themselves as addicted had significantly higher addiction scores. Conversely, those who did not consider themselves addicted had substantially lower scores. This pattern was contradicted by Geyer *et al.,* [18] but consistent with Candussi *et al.,* [19] and Murthy and Tauro [9], who reported that self-perceived overuse was strongly correlated with addictive behaviors among adolescents. This strong alignment between subjective perception and measured addiction underscores the reliability of self-awareness in identifying problematic use.

Besides, late-night smartphone use was another critical factor associated with higher addiction scores. Students who used their smartphones at 11 p.m. or later showed the greatest increase in addiction scores, suggesting that delayed sleep routines and night-time usage may either reflect or contribute to more severe addictive behavior. This finding is similar to the research by Ratan *et al.,* [11], Sohn *et al.,* [5], and Susmitha *et al.,* [20], all of whom found that later usage times were significantly linked to smartphone addiction. Such patterns may reflect impaired self-control and continued use despite negative consequences, which is a hallmark of behavioral addiction.

Surprisingly, students who stopped using their smartphones at least one hour before falling asleep scored significantly higher on addiction measures compared to those who stopped within 30 minutes, contradicting the finding of Sohn *et al.,* [5]. This suggests a more complex relationship between pre-sleep digital habits and overall smartphone addiction than previously understood, warranting further investigation into compensatory behaviors or self-regulation attempts among highly addicted individuals. One possible explanation is that students with higher addiction tendencies may be more acutely aware of their problematic use (as found in this study) and, as a self-regulation strategy, attempt to implement stricter boundaries, such as an earlier digital cutoff time. This aligns with studies suggesting that individuals experiencing problematic digital use often recognize its negative impacts and engage in various, albeit sometimes unsuccessful, attempts at self-control [21,22].

The overall regression model, which includes five significant predictors (gender, purpose, self-evaluation, latest use time, and stop use duration before sleep), provides a robust framework for understanding what drives smartphone addiction in this student population. The absence of multicollinearity among variables strengthens the validity of these findings. While the study offers

valuable insights, it is not without limitations. First, it was conducted exclusively among foundation students from a single institution, limiting the generalizability of the results to the broader population of foundation students in Sabah. To address this, future research should expand the sample to include students from matriculation and private institutions, thereby improving the representativeness of the findings across Sabah. Additionally, the self-administered nature of the questionnaire introduces the possibility of response bias, as participants may have misreported their behaviors or perceptions. Incorporating diagnostic interviews in future studies could improve the accuracy and reliability of the results. Lastly, the cross-sectional design of this study limits causal interpretations; thus, longitudinal research is recommended to better understand the direction and development of smartphone addiction over time.

5. Conclusion

In conclusion, this study highlights that usage patterns, rather than demographic factors, primarily influence smartphone addiction among Foundation Program students. While gender emerged as a significant predictor, behavioral factors such as purpose of use, self-perceived addiction, night-time engagement, and duration of use prior to sleep demonstrated a more direct and substantial influence on addiction risk. These factors warrant attention in efforts to reduce smartphone dependency in higher education.

The findings have important implications for intervention and prevention strategies. Rather than targeting specific demographic groups, interventions should focus on behavioral factors that influence health outcomes. For example, limiting late-night smartphone use and increasing awareness of self-perceived addiction could form the basis of effective prevention measures. Furthermore, recognizing communication-based smartphone use as a risk factor may help educators and counselors guide students toward healthier digital communication habits.

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References

[1] Ching, Siew Mooi, Kai Wei Lee, Anne Yee, Dhashani Sivaratnam, Fan Kee Hoo, Wan Sulaiman WA, Mohd Hazmi Mohamed et al. "The Malay version of smartphone addiction scale: Development, factor structure and validation of a short form for Malaysian adolescents." *The Medical Journal of Malaysia* 75, no. 5 (2020): 561-567.

[2] Hamamura, Toshitaka, Nao Kobayashi, Taiki Oka, Issaku Kawashima, Yuki Sakai, Saori C. Tanaka, and Masaru Honjo. "Validity, reliability, and correlates of the Smartphone Addiction Scale–Short Version among Japanese adults." *BMC psychology* 11, no. 1 (2023): 78. https://doi.org/10.1186/s40359-023-01095-5

[3] Mason, Michela Cesarina, Gioele Zamparo, Andrea Marini, and Nisreen Ameen. "Glued to your phone? Generation Z's smartphone addiction and online compulsive buying." *Computers in Human Behavior* 136 (2022): 107404. https://doi.org/10.1016/j.chb.2022.107404

[4] Hassim, Siti Rubiaehtul, Wan Nor Arifin, Yee Cheng Kueh, and Nor Azwany Yaacob. "Confirmatory factor analysis of the Malay version of the smartphone addiction scale among medical students in Malaysia." *International journal of environmental research and public health* 17, no. 11 (2020): 3820. https://doi.org/10.3390/ijerph17113820

[5] Sohn, Sei Yon, Lauren Krasnoff, Philippa Rees, Nicola J. Kalk, and Ben Carter. "The association between smartphone addiction and sleep: a UK cross-sectional study of young adults." *Frontiers in psychiatry* 12 (2021): 629407. https://doi.org/10.3389/fpsyt.2021.629407

[6] Otsuka, Yuichiro, Yoshitaka Kaneita, Osamu Itani, and Yuuki Matsumoto. "The Japanese youth version of the smartphone addiction scale among the youth in Japan: reliability and validity assessment." *International Journal of Mental Health and Addiction* 21, no. 1 (2023): 292-307. https://doi.org/10.1007/s11469-021-00594-z

[7] Bai, Haiqing, Jiatong Liu, Wenshi Bai, and Ting Cao. "Social pressures and their impact on smartphone use stickiness and use habit among adolescents." *Heliyon* 10, no. 7 (2024). https://doi.org/10.1016/j.heliyon.2024.e29111

[8] Abdullah, Nur Nabilah, Suziyani Mohamed, Kamariah Abu Bakar, and Noratiqah Satari. "The influence of sociodemographic factors on mobile device use among young children in Putrajaya, Malaysia." *Children* 9, no. 2 (2022): 228. https://doi.org/10.3390/children9020228

[9] Murthy, J. V., and V. G. Tauro. "Smartphone addiction and the associated factors of adolescents and purposes and pattern of smartphone use." *Int J Sci Healthc Res* (2024). https://doi.org/10.52403/ijshr.20240120

[10] Çiçek, Ilhan, Selami Tanrıverdi, Mehmet Emin Şanlı, and Metin Bulus. "Parental attitudes and socio-demographic factors as predictors of smartphone addiction in university students." *International Journal of Psychology and Educational Studies* 8, no. 2 (2021): 158-169. https://doi.org/10.52380/ijpes.2021.8.2.430

[11] Ratan, Zubair Ahmed, Anne-Maree Parrish, Mohammad Saud Alotaibi, and Hassan Hosseinzadeh. "Prevalence of smartphone addiction and its association with sociodemographic, physical and mental well-being: a cross-sectional study among the young adults of Bangladesh." *International journal of environmental research and public health* 19, no. 24 (2022): 16583. https://doi.org/10.3390/ijerph192416583

[12] Said, Abdul Hadi, Farah Natashah Mohd, Muhammad Zubir Yusof, Nur Afiqah Nadiah Mohd Win, Aisha Najwa Mazlan, and Alya Syahira Shaharudin. "Prevalence of smartphone addiction and its associated factors among pre-clinical medical and dental students in a public university in Malaysia." *Malaysian Family Physician: the Official Journal of the Academy of Family Physicians of Malaysia* 17, no. 3 (2022): 64. https://doi.org/10.51866/oa.75

[13] Hair, Joseph F., William C. Black, Barry J. Babin, and Rolph E. Anderson. "Multivariate data analysis eight edition." *Cengage Learning EMEA: United Kingdom* (2019).

[14] Jubok, Zainodin Hj, Khuneswari Gopal Pillay, and Noraini Abdullah. *Model-Building Approach in Multiple Regression*. Universiti Malaysia Sabah Press, 2019.

[15] Ghosh, Trishan, Deblina Sarkar, Kingsuk Sarkar, Chanchal Kumar Dalai, and Arnab Ghosal. "A study on smartphone addiction and its effects on sleep quality among nursing students in a municipality town of West Bengal." *Journal of Family Medicine and Primary Care* 10, no. 1 (2021): 378-386. https://doi.org/10.4103/jfmpc.jfmpc_1657_20

[16] Lee, K., S. Ching, Norsiah Ali, C. Ooi, S. Kamal, Azlin Amat, and D. Sivaratnam. "Prevalence and factors associated with smartphone addiction among adolescents–a nationwide study in Malaysia." *Int J Ment Health Promot* 25, no. 02 (2023): 237-247. https://doi.org/10.32604/ijmhp.2023.013407

[17] Nasution, Fachrul Ahyar, Mustafa M. Amin, and Elmeida Effendy. "Factors Associated with Smartphone Addiction during COVID-19 Pandemic Lockdown in Students of Faculty of Medicine in North Sumatera." *Open Access Macedonian Journal of Medical Sciences* 10, no. T7 (2022): 59-62. https://doi.org/10.3889/oamjms.2022.9257

[18] Geyer, Kristoffer, Xavier Carbonell, Marta Beranuy, and Fran Calvo. "Absence of objective differences between self-identified addicted and healthy smartphone users?." *International Journal of Environmental Research and Public Health* 18, no. 7 (2021): 3702. https://doi.org/10.3390/ijerph18073702

[19] Candussi, Catharina J., Russell Kabir, and Madhini Sivasubramanian. "Problematic smartphone usage, prevalence and patterns among university students: A systematic review." *Journal of Affective Disorders Reports* 14 (2023): 100643. https://doi.org/10.1016/j.jadr.2023.100643

[20] Susmitha, Turaga Sai, S. Jagadeeswara Rao, and Dolar Doshi. "Influence of smartphone addiction on sleep and mental wellbeing among dental students." *Clinical Epidemiology and Global Health* 25 (2024): 101447. https://doi.org/10.1016/j.cegh.2023.101447

[21] Pastor, Yolanda, Antonio García-Jiménez, and Mari-Cruz López-de-Ayala. "Regulatory strategies for smartphone use and problematic Internet use in adolescence." *Anales de psicología* 38, no. 2 (2022): 269. https://doi.org/10.6018/analesps.461771

[22] Zhu, Yicheng. "The Role of Self-Regulation in Internet Addiction during Adolescence." *Lecture Notes in Education Psychology and Public Media* 18 (2023): 69-75. https://doi.org/10.54254/2753-7048/18/20231291