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Nomophobia, phubbing, and deficient sleep patterns in college students

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In the current context, excessive mobile device use has led to new issues, such as nomophobia—an irrational fear of being without a mobile phone—and phubbing, which involves ignoring nearby people in favor of using one's phone. These behaviors are increasingly prevalent among young people, particularly in university settings, and can negatively impact well-being, including the emergence of poor sleep patterns. Given that sleep is essential for academic performance and mental health, examining how nomophobia and phubbing relate to disruptions in university students' sleep habits is crucial. This study aimed to analyze the correlation between nomophobia, phubbing, and poor sleep patterns among university students, determine whether nomophobia and phubbing are significant predictors of these patterns, and examine the individual contribution of each variable on sleep. A non-experimental, cross-sectional, quantitative design with correlational-explanatory scope was used, conducted from March to June 2023. The sample consisted of 533 students from a private university in Peru, aged 18 to 24, selected through non-probabilistic sampling. Data were collected using the Short Nomophobia Questionnaire (SNQ-5) and the Brief Phubbing Scale (BPS-6), validated instruments with strong internal consistency. The results showed moderate positive correlations between nomophobia, phubbing, and poor sleep patterns. Linear regression analysis indicated that the predictor variables explained 45.1% of the variance in poor sleep patterns. Nomophobia significantly affected all three analyzed sleep patterns (late nights, insomnia, and short sleep), whereas phubbing significantly impacted only short sleep. The findings underscore the importance of addressing excessive mobile device use in university settings, as both nomophobia and phubbing affect students' sleep quality. Future research is recommended to explore their impact on mental health and evaluate interventions to mitigate these phenomena and their implications for academic performance.

KEYWORDS

nomophobia, keyword, phubbing, poor sleep patterns, mobile technology, digital behavior, smartphone dependence

1 Introduction

The COVID-19 pandemic has profoundly impacted people's behavior, transforming social and professional development (Navas-Echazarreta et al., 2023). The need to adapt to virtual environments has significantly altered how individuals interact with their surroundings, particularly concerning technology (Ramos-Soler et al., 2017; Pastor Molina, 2022). The connection between the pandemic and technological dependency has emerged as people sought solutions and solace in virtual spaces during periods of isolation (Aydin and Kuş, 2023).

This phenomenon has dramatically impacted global mental health, exacerbating disorders like anxiety and depression and altering patterns of social interaction, especially among young people, where the effects of excessive technology use have underscored the scale of the issue (Candussi et al., 2023). The growing dependence on smartphones has been interpreted as a response to maintaining social connections in a physically distanced world. Thus, the pandemic has redefined human interaction and modified individuals' relationship with technology, significantly affecting emotional and psychological well-being (Kaur et al., 2021).

In this context of social transformation, there is increasing concern regarding excessive smartphone use (León-Mejía et al., 2021). Various studies have highlighted the negative consequences of this dependency, as these devices enable constant connectivity, regardless of place or time (Daraj et al., 2023; Rahmillah et al., 2023). This continuous attachment has led to a phenomenon known as nomophobia, defined as the fear, anxiety, and distress experienced when unable to access a mobile phone (Karaoglan et al., 2019, cited in Yousefian and Khodabakhshi-Koolaee, 2023).

Nomophobia is closely associated with emotional disorders such as anxiety and depression and has created challenges in educational settings due to its high (Ratan et al., 2021; Yildiz Durak, 2019).

Since its conceptualization in 2008, nomophobia has been widely studied and recognized as a defining disorder of the 21st century. Its relevance has grown within the academic community, as evidenced by the increasing number of publications on the topic (Jahrami et al., 2023). This dependency affects people of different ages and genders, although with certain contextual variations (Xu et al., 2022). Nomophobic symptoms are especially prevalent among university students and significantly impact their quality of life (Essel et al., 2022; Jelleli et al., 2023). Recent studies have confirmed that nomophobia can contribute to insomnia, affect academic performance, and increase symptoms of anxiety and depression, underscoring the need to address this issue within educational and clinical domains (Aldhahir et al., 2023; Alavi et al., 2020).

Among the various variables associated with nomophobia, phubbing and psychological issues such as insomnia have gained relevance due to their rising prevalence among students (Copaja-Corzo et al., 2022; Vagka et al., 2023; Díaz Miranda and Extremera Pacheco, 2020), phubbing refers to the act of paying more attention to one's phone than to people during social interactions (Garcia et al., 2023)—a problematic behavior that has grown in today's context, where the use of social media has become omnipresent (Tanhan et al., 2024). This phenomenon primarily affects adolescents and young adults (Ríos Ariza et al., 2021). It has been linked to the deterioration of interpersonal relationships and a decline in the quality of social interactions, especially within educational and family settings (Capilla Garrido et al., 2021).

Both phubbing and nomophobia are tied to the increasing prevalence of smartphones and constant internet access (Bratina, 2019) particularly among university students, who are especially vulnerable to the effects of technological dependency (Mac Cárthaigh et al., 2020; Lin, 2023).

1.1 Instruments

1.1.1 Instruments for nomophobia and phubbing

The Nomophobia Questionnaire (NMP-Q) has undergone various adaptations over time. Initially designed in the United States by Yildirim and Correia, it was translated into Spanish and adapted to contexts in several countries, including Peru (Ramos-Soler et al., 2017; León-Mejía et al., 2020; León-Mejía et al., 2021). The Peruvian version includes four dimensions related to nomophobia and is notable for its ability to be administered collectively, with an estimated administration time of 14 to 20 min. Other versions of the NMP-Q adapted to different contexts have emerged primarily in Europe, validating the questionnaire in countries such as Spain, Italy, Portugal, China, Germany, Greece, Indonesia, Iran, Turkey, and Brazil, demonstrating its cross-cultural robustness (Jelleli et al., 2023). Even in the Arab region, such as Tunisia, the NMP-Q was adapted and validated with 644 participants, maintaining its four-factor structure.

However, the trend has shifted toward creating shorter instruments, such as the Indonesian version of the 10-item Nomophobia Questionnaire called NMPQ-10. This version was validated with 276 university students, showing good psychometric properties and a solid internal structure. Its brevity makes it an effective tool for identifying nomophobia in less time than the original 20-item version (Warsah et al., 2023).

Regarding phubbing, there are fewer adapted instruments than for nomophobia. However, a similar trend of shortening instruments has been observed in Peruvian contexts. Questionnaires have gone from 23 items (Cumpa, 2017) to shorter versions, such as the 16-item version validated in a sample of 454 students, which showed good validity and reliability values (Ríos Ariza et al., 2021). Finally, the Bifactorial Phubbing Scale, which has ten items, is a reliable tool for assessing this behavior (Correa-Rojas et al., 2022).

1.1.2 Nomophobia, phubbing, and sleep

The rapid expansion of smartphone use has brought about profound changes in individual and social behavior patterns, negatively impacting sleep and user well-being, especially among young university students. Sleep disorders associated with nomophobia and phubbing are increasingly common, as both phenomena represent problematic forms of internet use that interfere with sleep routines and affect students' physical and mental health (Demircioğlu, 2024; Maltese et al., 2018; Nair et al., 2020). Recent studies indicate that insufficient sleep deteriorates cognitive functioning, memory, and emotional state, significantly impacting academic performance and general well-being (Angelillo et al., 2023; Bini et al., 2024).

This study proposes several hypotheses about the relationship between nomophobia, phubbing, and sleep problems, such as insomnia, staying late, and short sleep patterns. These hypotheses are supported by previous research showing how excessive mobile device use affects circadian rhythms and sleep quality, an issue that has intensified during the COVID-19 pandemic (Farchakh et al., 2021). Empirical data suggests that around 79% of young people between the ages of 18 and 24 who have nomophobia check their phones at night, contributing to problems like insomnia and short sleep patterns in the university population (Acosta-trejo, 2017; Kater et al., 2024).

It is hypothesized that nomophobia and phubbing are not only related to sleep problems but may also be significant predictors of poor sleep patterns among university students. This relationship is based on the fact that both disruptive behaviors create a cycle of sleep disruption, as they extend mobile phone use into nighttime hours, which can lead to long-term consequences on students' mental and academic health (Thomée, 2018; Bayas Condo and Herrera López, 2023).

The hypothesis that nomophobia and phubbing can predict poor sleep patterns is grounded in studies showing how nighttime mobile phone use interferes with sleep quality by altering circadian rhythms (Zhu et al., 2024). Furthermore, nomophobia is expected to have a more direct impact on insomnia due to the anxiety of being disconnected, while phubbing may be more related to reduced sleep quality by promoting prolonged phone use during nighttime hours (Capilla Garrido et al., 2021; Demircioğlu, 2024).

Although research on nomophobia, phubbing, and sleep problems in the Peruvian context is limited, some studies suggest that excessive use of mobile devices is an important factor in the development of sleep disorders. Among the mechanisms explaining this phenomenon is the prolonged exposure to blue light emitted by device screens, which disrupts circadian rhythms and reduces sleep quality (Copaja-Corzo et al., 2022).

This study explores the relationship between nomophobia and poor sleep patterns among university students and the impact of phubbing on sleep quality in this population. The research questions are: What is the relationship between nomophobia and poor sleep patterns among university students? How does phubbing affect sleep quality in this population? Are nomophobia and phubbing significant predictors of poor sleep patterns? These questions are crucial, as the literature suggests a connection between excessive mobile device use and sleep disruption. However, clarifying how these phenomena interact in specific university contexts is necessary.

In this regard, the main objective of this study is to assess whether nomophobia and phubbing are significant predictive variables of poor sleep patterns among university students. This objective aligns with evidence suggesting that problematic mobile phone use and interactions mediated by these devices are closely linked to alterations in sleep quality and quantity (Alzhrani et al., 2023; Yang et al., 2023). By focusing on these two phenomena, the study aims to determine their differentiated contribution to poor sleep patterns, which is fundamental given the increasing technological dependency on university life (Alghwiri et al., 2021; Safdar Bajwa et al., 2023).

2 Materials and methods

2.1 Study design

This study follows a quantitative approach with a non-experimental, cross-sectional design that is both correlational and explanatory in scope. The quantitative approach was chosen for its ability to measure and analyze the relationships among the variables involved objectively. Given that no variables were actively manipulated, the non-experimental design was appropriate for observing phenomena in their natural environment. The cross-sectional nature implies that data were collected at a single point in time, which is suitable for assessing the status of variables at a specific moment. The correlational approach seeks to identify relationships between variables, while the explanatory approach aims to understand the factors influencing these relationships, aligning with the study's objectives.

2.2 Participants

The sample was selected through non-probabilistic convenience sampling based on the accessibility of students enrolled in a private university in Arequipa during the 2023 academic year. A total of 533 university students participated. Inclusion criteria considered regular students aged 18 to 24 enrolled in undergraduate programs and attending in-person classes. Students under 18 (aged 16 and 17) and those enrolled in hybrid or online programs were excluded to maintain consistency in academic and contextual conditions.

Although non-probabilistic sampling was employed, the total student population at the university was 14,128. Using a 5% margin of error and a 95% confidence level, the calculation for probabilistic sampling indicated that at least 375 participants were needed. However, to enhance the reliability of the results and due to the limitations inherent in non-probabilistic sampling, the sample size was increased by over 40%, reaching 533 students. This increase allowed for a closer approximation of the representativeness of the university population. Regarding gender, the sample consisted of 49% men (261) and 51% women (272), accurately reflecting the university's demographic distribution.

The participants' ages ranged from 18 to 24, with a mean age of 20.5 years. Regarding sociodemographic characteristics, most students were from middle-class families, as inferred from university tuition data. While the sample was relatively homogeneous in socioeconomic terms, there was diversity in cultural background, with students from various regions of Peru, which could influence their perspectives on technology and mental health. All participants were pursuing undergraduate studies across different fields, ensuring variability in academic disciplines and contributing to the representativeness of the university's diverse faculties.

2.3 Procedures

Data collection took place between June and November 2023 on the premises of the private university in Arequipa. Scheduling was coordinated with faculty to avoid disrupting academic activities. Prior to participation, a detailed explanation of informed consent was provided, highlighting data confidentiality and participants' right to withdraw from the study at any time without repercussions. A brief overview of the instruments was given, along with clear instructions for participants to complete their responses independently. Data analysis was performed using the Jamovi software.

The statistical analysis began by exploring the correlation between the variables nomophobia and phubbing, controlled by the variable of poor sleep patterns, using Spearman's Rho correlation coefficient. Subsequently, the Omnibus Likelihood Ratio Test was applied to assess whether the predictor's nomophobia and phubbing explained the variability in poor sleep patterns and to determine whether the overall model was significant. Metrics such as the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and R^2McF (McFadden), R^2CS (Cox and Snell), and R^2N (Nagelkerke) values were used to assess the model's goodness-of-fit.

2.4 Ethical considerations

Ethical standards in social science research were upheld throughout the study. Participants were informed about the study's nature, their right to withdraw, and confidentiality measures, including data anonymization and aggregated reporting of results to protect their identities. Given the sensitive topics addressed, such as mental health and technology use, additional protocols were implemented to mitigate potential psychological distress and offer support if needed.

2.5 Instruments

Shortened versions of the instruments were utilized, maintaining the psychometric rigor of the complete versions. These brief adaptations are justified by the time constraints faced by educational psychologists and teachers, who, due to their academic responsibilities, require more efficient tools to identify risk profiles and take preventive measures. Thus, the Short Nomophobia Questionnaire (SNQ-5) was developed, consisting of five items with a scale from 1 to 4 and a range of 5 to 20 points, based on the NMP-Q adapted for the Peruvian population (Franco-Guanilo, 2022). To measure phubbing, a shortened version of the (Cumpa, 2017). Phubbing scale was employed, named the Brief Phubbing Scale (BPS-6), which includes six items, with a scale from 1 to 4 and a range of 5 to 24 points.

2.5.1 Instrument 1

The Short Nomophobia Questionnaire (SNQ-5) exhibited strong internal consistency, with a Cronbach's alpha coefficient of 0.931 and a McDonald's omega of 0.933 (Table 1). Bartlett's test of Sphericity indicated a significant *p*-value ($p = 0.00$), suggesting that the data were suitable for factor analysis (Table 2). The overall KMO index was 0.872, with individual MSA values ranging from 0.858 to 0.898 (Table 3). Factor loadings varied between 0.822 and 0.895, with uniqueness values between 0.200 and 0.324 (Table 4), supporting a robust relationship among the items. The model fit indices (CFI = 0.992, TLI = 0.919, SRMR = 0.0150, RMSEA = 0.182, with a 90% CI between 0.0464 and 0.359) demonstrated the validity and reliability of the instrument. Despite the high RMSEA value, the broad variability of the data justifies its value, alleviating potential concerns regarding validity. The residuals from the observed correlation matrix (Table 5) were below 0.05, suggesting minimal discrepancies among the items and supporting the instrument's validity for future research or interventions.

Additionally, model fit measures (Table 6), including a CFI of 0.992, TLI of 0.919, SRMR of 0.0150, and RMSEA of 0.182, along with a 90% confidence interval of RMSEA ranging from 0.0464 to 0.359, support the validity and reliability of the instrument for use in future research or practical applications. It is acknowledged that the relatively high value of RMSEA may be attributed to the wide variability in the data, as suggested by its wide confidence interval, mitigating the validity problem associated with this single point. Furthermore, the values of the residuals from the observed correlation matrix in Table 5 are less than 0.05, indicating minimal discrepancies between items, with values close to zero on the main diagonal and off-diagonals, thus supporting the validity of the observed data and the consistency of the

TABLE 1 Reliability statistics of the SNQ-5.

	α de Cronbach	ω de McDonald
scale	0.931	0.933

Cronbach's alpha and McDonald's omega coefficients estimate the scale's internal consistency to measure Nomophobia.

TABLE 2 Bartlett's Sphericity test SNQ-5.

χ^2	gl	*p*
456	10	< 0.001

Bartlett's Sphericity test has a *p*-value of 0.00, indicating a significant difference between the observed correlation matrix and an identity matrix. The null hypothesis of no correlation between variables is rejected, suggesting its suitability for factor analysis.

TABLE 3 Sampling adequacy measure KMO of the SNQ-5.

	MSA
Global	0.872
Item 1	0.878
Item 2	0.869
Item 3	0.858
Item 4	0.859
Item 5	0.898

Sampling adequacy was evaluated using the Kaiser-Meyer-Olkin (KMO) measure and the Measure of Sampling Adequacy (MSA). The results showed an overall KMO of 0.872, indicating an adequate correlation between variables for factor analysis. Additionally, individual MSA values for each item ranged between 0.858 and 0.898, suggesting adequate sampling adequacy for each scale item used in this study.

TABLE 4 Factor loadings of the SNQ-5.

	Factor	Uniqueness
	1	
Item 1	0.854	0.271
Item 2	0.822	0.324
Item 3	0.895	0.200
Item 4	0.856	0.268
Item 5	0.861	0.259

Factor loadings were calculated using the 'Minimum Residual' extraction method, which is robust against data non-normality. An Oblimin rotation was used for methodological consistency, although it is not essential in a single factor. Loadings ranged between 0.822 and 0.895, indicating a significant relationship between the items and the factor. Uniqueness values, between 0.200 and 0.324, are low, suggesting that the underlying common factor explains a large proportion of the variance of each item, thus supporting an adequate relationship between them.

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TABLE 5 Residuals of the observed correlation matrix of the SNQ-5.

	Item 1	Item 2	Item 3	Item 4	Item 5
Item 1		0.000	−0.003	−0.034	0.034
Item 2			0.005	0.031	−0.030
Item 3				−0.012	0.014
Item 4					−0.000
Item 5					

The residuals of the observed correlation matrix, as shown in the table, reveal that discrepancies between items are minimal, with values close to zero on the main diagonal and off-diagonals. This consistency suggests a strong agreement between items, supporting the validity of the observed data and the coherence of the instrument used in the study.

TABLE 6 Fit measures of the SNQ-5.

CFI	TLI	SRMR	90% CI of RMSEA		
			RMSEA	Inferior	Superior
0.992	0.919	0.0150	0.182	0.0464	0.359

Model fit measures indicate an excellent overall fit. The Comparative Fit Index (CFI) was 0.992, the Tucker-Lewis Index (TLI) was 0.919, and the Standardized Root Mean Square Residual (SRMR) was 0.0150. These values suggest an adequate fit of the model to the observed data.

instrument used in the study. That suggests good agreement between items, supporting the construct validity of the observed data.

The flowchart (Figure 1) illustrates the process of confirmatory factor analysis conducted to validate the SNQ-5 instrument.

2.5.2 Instrument 2

The Brief Phubbing Scale (BPS-6) demonstrated high internal consistency, with a Cronbach's alpha coefficient ($\alpha = 0.945$) and a McDonald's omega coefficient ($\omega = 0.947$), indicating satisfactory reliability for this abbreviated version of the scale designed to measure phubbing (Table 7). Bartlett's test of Sphericity (Table 8) revealed a p-value of 0.01, suggesting a significant correlation between the variables and confirming the appropriateness of the data for more detailed factor analyses.

The Kaiser-Meyer-Olkin (KMO) index, shown in Table 9, was 0.906, indicating excellent sample adequacy, while the individual Measure of Sampling Adequacy (MSA) values for each item ranged from 0.894 to 0.919, confirming the suitability of the sampling for each item of the scale. The Minimum Residual extraction method and an Oblimin rotation were used to assess the factor loadings. The results showed that the factor loadings (Table 10) varied between 0.831 and 0.913, suggesting a significant relationship between the items and the underlying factor. The uniqueness values ranged from 0.166 to 0.310, which were relatively low, supporting the adequate interrelation among the items and negating their independence, thus reinforcing the scale's validity.

The model fit indices (Table 11) were also satisfactory, with a Comparative Fit Index (CFI) of 0.992, a Tucker-Lewis Index (TLI) of 0.981, and a Standardized Root Mean Square Residual (SRMR) of 0.0457, indicating that the model fits the observed data well.

The abbreviated adaptations of the instruments used in this study maintain the psychometric rigor of the complete versions, as evidenced by the obtained results, and provide an efficient tool for measuring nomophobia and phubbing within the studied demographic group. These brief versions offer additional advantages in terms of agility and accessibility in the evaluation process without compromising the accuracy and validity of the collected data.

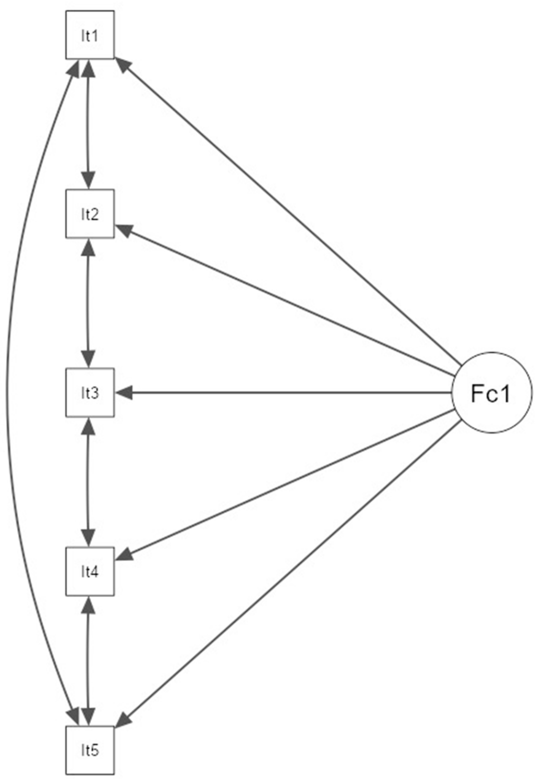

FIGURE 1
Flowchart of the SNQ-5. Arrows represent the stages of analysis, indicating the direction of workflow. The first arrows mark the beginning of the factor analysis process from the initial oval to each item. Next, the arrows between items indicate factor extraction using the minimum residual method. Subsequently, the arrow spanning from item 1 to item 5 represents the Oblimin rotation applied to enhance the interpretation of the identified factors and marks the end of the diagram, indicating the completion of the factor analysis process.

TABLE 7 Reliability statistics of the BPS-6 scale.

	Cronbach's alpha	McDonald's omega
scale	0.945	0.947

Both coefficients estimate the internal consistency of the brief scale used to measure Nomophobia. The Cronbach's alpha coefficient (α = 0.945) and the McDonald's omega coefficient (ω = 0.947).

TABLE 8 Bartlett's Sphericity test of the BPS-6.

χ^2	fd	p
618	15	< 0.001

Bartlett's Sphericity Test yielded a p-value of 0.01, indicating that the variables are correlated, suggesting that the data are suitable for further analysis.

The flowchart (Figure 2) illustrates the process of confirmatory factor analysis to validate the SNQ-5 instrument.

3 Results

Following the first objective to analyze the correlation between nomophobia, phubbing, and poor sleep patterns in university

TABLE 9 Sampling adequacy measure KMO of the BPS-6.

	MSA
Global	0.906
Item 3	0.898
Item 5	0.894
Item 7	0.902
Item 9	0.919
Item 15	0.911
Item 19	0.916

The overall value of the Kaiser-Meyer-Olkin (KMO) is a measure that assesses the proportion of shared variance among variables, which was 0.906, indicating adequate correlation. The individual values of the Measure of Sampling Adequacy (MSA) for each item ranged between 0.894 and 0.919, confirming that the sampling was adequate for each item of the scale used.

TABLE 10 Cargas de los factores de la BPS-6 factor loadings of the BPS-6.

	Factor	
	1	Uniqueness
Item 3	0.831	0.31
Item 5	0.913	0.166
Item 7	0.882	0.223
Item 9	0.834	0.305
Item 15	0.872	0.24
Item 19	0.854	0.27

The "Minimum Residual" extraction method was used in combination with an "OBLIMIN" rotation. Loadings ranged between 0.831 and 0.913, indicating a significant relationship between the items and the factor. Uniqueness values, between 0.166 and 0.310, were low, rejecting the independence of each item, supporting the adequate relationship between them.

TABLE 11 Fit measures of the BPS-6.

				90% CI of RMSEA	
CFI	TLI	SRMR	RMSEA	Inferior	Superior
0.992	0.981	0.0457	0.0653	0.0346	0.0985

The Comparative Fit Index (CFI) was 0.992, the Tucker-Lewis Index (TLI) was 0.981, and the Standardized Root Mean Square Residual (SRMR) was 0.0457, suggesting adequate model fit to the observed data.

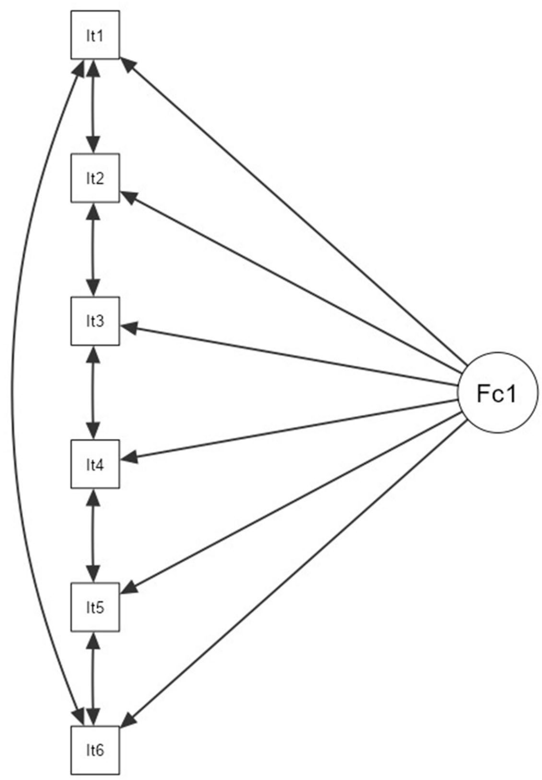

FIGURE 2
Flowchart of the BPS-6. Arrows represent the stages: from the beginning to each item, then factor extraction between items, and finally Oblimin rotation. The arrow covering all items indicates the application of rotation. The diagram concludes upon completion of the factor analysis.

TABLE 12 Partial correlation between nomophobia and phubbing.

		Nomophobia	Phubbing
Nomophobia	Spearman's Rho	—	
	p-value	—	
Phubbing	Spearman's Rho	0.401	—
	p-value	< 0.001	—

The correlation between nomophobia and phubbing was controlled for the variable deficient sleep patterns. The Spearman correlation coefficient (Rho) was used to assess these relationships.

students, Table 12 presents a moderate positive correlation between these variables (Rho = 0.401, $p < 0.001$). This finding indicates that higher levels of nomophobia and phubbing among university students are more likely to coincide with experiencing poor sleep patterns, such as insomnia, staying up late, and short sleep duration. These results suggest a significant relationship between anxiety related to disconnection (nomophobia), the behavior of ignoring others in favor of one's phone (phubbing), and sleep quality within this demographic group.

According to the second objective to explore further the predictive relationship of these variables, a linear regression analysis was conducted to obtain regression coefficients, which indicate the magnitude and direction of the relationship between the predictor variables (nomophobia and phubbing) and the dependent variable (poor sleep patterns). The results revealed that both nomophobia and phubbing are significant predictors of sleep issues, with associated *p*-values confirming the statistical significance of these relationships ($p < 0.05$ for both variables). That suggests that excessive use of mobile devices and anxiety over disconnection contribute to sleep quality in this population.

Previously, an Omnibus Likelihood Ratio Test was performed, with results displayed in Table 13, yielding a *p*-value of 0.01. This indicates that the whole model provides a significantly better fit than the null model, suggesting that the presence and level of nomophobia and phubbing significantly impact the poor sleep patterns of the university students included in this study.

In line with the third objective, examining the individual contribution of each variable (nomophobia and phubbing) to poor sleep patterns, the analysis results in Table 14 indicate that nomophobia and phubbing are significantly associated with poor sleep patterns in university students. The McFadden R^2 adjustment measure indicates that the model explains approximately 45.1% of the variability in poor sleep patterns, highlighting the importance of these variables in understanding the sleep habits of university students. Although the model does not account for all variability, as evidenced by the deviation, its predictive capability and the statistical significance of the predictor variables support the hypothesis that anxiety over disconnection and problematic use of mobile devices is strongly related to sleep issues in this context.

In order to delve deeper into the contribution of each variable, the analysis focused on pairs of dimensions within the "Poor Sleep Patterns" variable. The results, found in Table 15, were:

In insomnia and staying up, the constant coefficient (−3.3458) suggests that students are less likely to experience insomnia or stay awake without the influence of nomophobia and phubbing. However, the positive coefficient for nomophobia (0.3262, $p < 0.001$) indicates that higher levels of nomophobia are associated with an increased likelihood of staying awake and experiencing insomnia. In contrast, phubbing did not significantly impact these patterns ($p = 0.339$), although its negative coefficient (−0.0613) suggests a possible, albeit nonsignificant, effect on reducing insomnia and wakefulness.

Regarding short sleep and insomnia, the constant coefficient (−24.7174) indicates that, without the effects of nomophobia and phubbing, university students would not have trouble falling asleep or experience prolonged insomnia. The positive coefficient for nomophobia (0.5652, $p < 0.001$) reflects a significant relationship, indicating that high levels of nomophobia are associated with difficulties sleeping and frequent episodes of insomnia. Furthermore, phubbing exhibited an even more pronounced effect (coefficient of 1.1527, $p < 0.001$), suggesting that elevated levels of phubbing are linked to shorter sleep durations and increased frequency of insomnia.

Finally, in the case of Short Sleep and Staying Up, the constant (−21.3713) suggests that, without the influence of nomophobia and phubbing, students are less likely to experience difficulties falling asleep or staying awake for prolonged periods. The positive coefficient for nomophobia (0.5652) indicates a significant relationship between high levels of nomophobia and the likelihood of staying awake and experiencing difficulties sleeping. Additionally, phubbing showed a considerable impact (1.1527, $p < 0.001$), indicating that students with elevated phubbing levels tend to stay awake longer at night, negatively affecting overall sleep quality.

TABLE 13 Likelihood ratio omnibus test.

Predictor	χ^2	fd	*p*
Nomophobia	28.2	2	< 0.001
Phubbing	132.3	2	< 0.001

The likelihood ratio omnibus test is a statistical technique for assessing the joint significance of predictor variables in the regression model.

4 Discussion

The transformation in our society, driven by the excessive use of smartphones, has raised alarms within the scientific community regarding its adverse consequences (León-Mejía et al., 2021; Daraj et al., 2023; Rahmillah et al., 2023). Phenomena such as nomophobia and phubbing have emerged as direct results of technological dependence, impacting, among other aspects, individuals' sleep patterns (Maltese et al., 2018; Nair et al., 2020; Farchakh et al., 2021; Kater et al., 2024).

This study examined the effects of nomophobia and phubbing on the sleep patterns of university students, focusing on three main objectives: (1) to analyze the correlation between nomophobia, phubbing, and poor sleep patterns; (2) to determine whether nomophobia and phubbing are significant predictors of these patterns; and (3) to assess the individual contribution of each predictor variable. The findings yielded relevant insights for each of these objectives, providing new evidence regarding the impact of these technological behaviors on the sleep quality of university students.

Regarding the first objective, our findings confirmed a significant correlation between nomophobia, phubbing, and poor sleep patterns, aligning with previous studies. Research by Jahrami (2023) in Bahrain and Lebanon highlighted a connection between increased mobile phone usage and various health issues, including insomnia (Farchakh et al., 2021). These studies corroborate our results, reinforcing the evidence that mobile phone dependence can negatively affect sleep quality and mental health among young individuals, generating anxiety and hindering adequate rest (Yang et al., 2023; Alzhrani et al., 2023; Demircioğlu, 2024).

A study on Saudi adults also identified that using electronic devices before sleep negatively affects sleep quality and contributes to excessive daytime sleepiness. This research found that the use of smartphones or tablets just before sleeping delayed sleep onset by more than 30 min for a significant portion of the sample, with 38.0% exhibiting high sleep dysfunction and 15.0% experiencing moderate to severe excessive daytime sleepiness (AlShareef, 2022). The findings underscore that using electronic devices before sleep can delay sleep onset, associated with daytime sleepiness issues. Other studies have also observed this pattern, reinforcing the necessity to address nomophobia and phubbing as risk factors for sleep health, particularly in adolescents and young adults (Álvarez et al., 2021; Tomczyk and Lizde, 2022). Peszka et al. (2020) noted that nomophobia significantly impacts the sleep quality of university students, a finding that coincides with our research results concerning the prevalence of this issue in educational settings. This phenomenon has been corroborated by other studies investigating how anxiety generated by digital disconnection contributes to insomnia and other sleep disorders. These findings underscore the importance of analyzing both nomophobia and phubbing as crucial risk factors for sleep health in young populations.

TABLE 14 Model fit measures.

							Model global test		
Model	Deviance	AIC	BIC	R^2_{McF}	R^2_{CS}	R^2_N	χ^2	gl	*p*
1	597	609	635	0.451	0.264	0.535	490	4	< 0.001

The metrics AIC (Akaike Information Criterion) and BIC (Bayesian Information Criterion) are included and used to assess the goodness of fit of statistical models, considering their complexity. Additionally, the values of R^2McF (McFadden's R-squared), R^2CS (Cox and Snell's R-squared), and R^2N (Nagelkerke's R-squared) are presented, representing the proportion of variance explained in the logistic regression model, adjusted for the number of predictors and the maximum amount of variance the model can explain.

TABLE 15 Coefficients of the model—poor sleep patterns.

Poor sleep patterns	Predictor	Estimador	EE	Z	*p*
Stay-up-insomnia	Constant	−3.3458	0.5343	−6.262	< 0.001
	Nomophobia	0.3262	0.0708	4.605	< 0.001
	Phubbing	−0.0613	0.064	−0.957	0.339
Short-sleep-insomnia	Constant	−24.7174	2.2004	−11.233	< 0.001
	Nomophobia	0.5652	0.1609	3.514	< 0.001
	Phubbing	1.1527	0.1518	7.594	< 0.001
Short-sleep-stay-up	Constant	−21.3713	2.1374	−9.999	< 0.001
	Nomophobia	0.239	0.1505	1.588	0.112
	Phubbing	1.0914	0.1412	7.727	< 0.001

The constant in the regression model establishes a reference point when the predictor variables Nomophobia and Phubbing are zero.

Concerning the second objective, our results indicate that nomophobia and phubbing are significant predictors of poor sleep patterns, explaining 45.1% of the variability in the dependent variable. These findings are consistent with previous studies, such as that by Jahrami (2023), which identified sleep dissatisfaction as an effective indicator for classifying nomophobia severity, demonstrating high accuracy in identifying affected individuals. Other studies reinforce this relationship; for instance, Ding et al. (2023) conducted research with a sample of 549 participants, highlighting how sleep disturbance directly correlates with the severity of nomophobia, allowing for the anticipation of problems associated with excessive smartphone use.

Moreover, Almodóvar et al. (2023) demonstrated that excessive and problematic technology use, including behaviors such as nomophobia and phubbing, is a primary cause of sleep disorders among university students in Spain. According to this study, more than half of the respondents experienced difficulties sleeping, a finding also supported by research from Zhu et al. (2024), which emphasizes the connection between inappropriate mobile phone use and sleep issues among youth, particularly in an academic context.

On the other hand, a study in Israel found that reduced sleep hours are a significant predictor of problematic smartphone use, especially during COVID-19 lockdowns (Zwilling, 2022). This study highlights that while an increase in smartphone addiction was observed during the pandemic, there was also an improvement in sleep quality following the lifting of restrictions, which aligns with previous research suggesting that the relationship between sleep and smartphone use can vary depending on social context and mobility restrictions (Brailovskaia et al., 2021). However, the findings suggest a vicious cycle: sleep deprivation contributes to excessive mobile phone use and is a consequence of it, exacerbating the problem in a continuous cycle (Mac Cárthaigh et al., 2020). This pattern has been observed in other studies, underscoring the importance of addressing this issue comprehensively, considering both sleep health and technological education for students (Nguyen et al., 2024).

The third objective of this research was to analyze the individual contribution of each predictor variable to poor sleep patterns. The results indicate that individuals with higher levels of nomophobia tend to stay awake longer and experience insomnia more frequently. These findings align with previous studies, such as that by Jahrami et al. (2021), which showed a significant impact of nomophobia on insomnia symptoms. Similarly, Torpil et al. (2022) revealed that university students with severe nomophobia exhibited decreased sleep quality and increased daytime sleepiness, reinforcing the connection between this condition and sleep disturbances.

Furthermore, a study conducted in Lebanon with young adults found that those with high smartphone dependence, like nomophobia symptoms, reported more outstanding sleep issues. This study also identified an inverse relationship between age and the severity of nomophobia, indicating that younger adults are more likely to experience adverse sleep effects due to mobile device use, a finding also reflected in other research exploring the relationship between age, phone use, and sleep problems (Farchakh et al., 2021; Demircioğlu, 2024). Nevertheless, some studies have not found age to be a determining factor in the intensity of nomophobia. However, they have confirmed the relationship between this condition and insomnia, as observed in the study by Jahrami et al. (2022).

In a study involving Peruvian medical students, Copaja-Corzo et al. (2022) found an association between nomophobia and poor sleep quality. They suggested that factors such as exposure to bright light and prolonged phone use before sleep could contribute to these problems, which has been corroborated by prior research highlighting the impact of electronic device light on sleep patterns (Christensen et al., 2016; Ibrahim, 2018 cited by Copaja-Corzo et al., 2022). These results underscore the importance of differentiating the individual effects of each variable on poor sleep patterns and developing preventive and educational strategies to address both nomophobia and problematic mobile device use, particularly in young and vulnerable populations.

Regarding phubbing, our findings indicated that this behavior does not significantly impact the sleep pattern known as “stay-up” (remaining awake late). However, a study conducted on Turkish university students found that phubbing levels were higher among those with a tendency to be night owls (Sert et al., 2023), that is, individuals who tend to stay awake during the night, albeit for relatively short periods (Sert et al., 2023). This finding suggests that while phubbing may not directly affect the total duration of nighttime wakefulness, it could be associated with irregular sleep patterns and later sleep schedules, contributing to increased daytime sleepiness among those exhibiting this behavior.

Our results also revealed that participants with high levels of phubbing tend to have shorter nighttime sleep, sacrificing rest hours, which may lead to insomnia. Coinciding with these findings, Li et al. (2023) documented that phubbing in a sample of 742 adolescents was directly related to increased daytime sleepiness. However, no direct impact on nighttime sleep quality was observed. These results underscore that while phubbing may not affect nighttime sleep duration or quality in all cases, its impact is reflected in alertness and daytime sleepiness issues, which could harm overall health.

Finally, a study related to parental phubbing—the behavior of parents ignoring their children due to mobile phone use—demonstrated a significant impact on sleep problems and the overall health of affected adolescents. In an analysis conducted with 781 Chinese adolescents, Ding et al. (2023) found that parental phubbing was directly related to sleep quality problems and adverse effects on adolescents’ mental health. This suggests that phubbing may indirectly affect sleep by generating stress or affecting interpersonal relationships, particularly within the family context, where its psychological impact notably influences adolescents’ rest and well-being (Capilla Garrido et al., 2021).

5 Conclusion

The fulfillment of the first objective of this research revealed a significant correlation between nomophobia, phubbing, and poor sleep patterns among university students. The results suggest that as dependence on mobile phones (nomophobia) and the tendency to ignore others due to excessive device use (phubbing) increase, students face more significant challenges regarding sleep quality. Identified issues include insomnia, staying up late, and short sleep duration, adversely affecting the necessary rest for optimal physical and mental functioning. This finding underscores these technological behaviors' negative influence on mental health and sleep physiology, which are essential for overall well-being and academic performance.

The predictive model analysis confirmed that nomophobia and phubbing are significant predictors of poor sleep patterns, accounting for 45.1% of their variability. This percentage is noteworthy, as it indicates that nearly half of the sleep problems in the sample can be attributed to these technological behaviors. These results highlight the importance of managing excessive mobile device usage and phubbing in university contexts to improve students' sleep quality. Identifying these factors as predictors provides a solid foundation for developing interventions to enhance sleep habits and the overall well-being of young adults.

Furthermore, individual findings showed that nomophobia significantly impacts the three evaluated sleep patterns: staying late, insomnia, and short sleep duration. Students with greater mobile dependence tend to stay up late, experience difficulties falling asleep, and sleep for shorter periods. That may lead to cumulative health consequences such as chronic fatigue, decreased cognitive performance, and a higher risk of emotional disorders. In contrast, while phubbing did not significantly impact staying up late or insomnia patterns, it did affect reduced sleep duration. That indicates that students who engage in phubbing often sacrifice hours of rest, potentially affecting their long-term well-being.

In conclusion, this study addresses excessive mobile device usage in academic settings. It is crucial to investigate how these technological behaviors may impact other aspects of mental health, such as anxiety and depression, and to evaluate the effectiveness of interventions aimed at reducing nomophobia and phubbing, thereby improving sleep quality and academic performance.

5.1 Limitations

This study has several limitations, including the use of non-probability sampling, which could compromise the representativeness of the results and limit their generalizability to other populations. By focusing exclusively on university students from a private institution in Peru, the findings may not apply to other cultural or geographic contexts. Additionally, the cross-sectional design prevents establishing causal relationships between the variables, limiting conclusions about the direct impact of nomophobia and phubbing. It is also essential to consider social and educational differences across regions that may influence the obtained results. Lastly, the reliance on self-reported data poses the risk of response bias and inaccuracies, which could affect the reliability of some data.

Considering these limitations, it is recommended that future research employ probability sampling methods to enhance external validity and generalize findings to different populations. Replicating this study in diverse cultural and educational contexts would strengthen the robustness of the results. Moreover, it would be advisable to utilize longitudinal or experimental designs to infer causal relationships among the studied variables, providing a more comprehensive and in-depth understanding of the relationship between nomophobia, phubbing, and sleep patterns in university environments.

Data availability statement

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found in the article/supplementary material.

Ethics statement

Ethical approval was not required as all participants were of legal age and provided consent to answer the questions. Additionally, the study did not involve any direct intervention with human participants. Furthermore, only anonymous data were collected through questionnaire responses, and their identities could not be identified. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

MG: Conceptualization, Formal analysis, Methodology, Resources, Validation, Writing – original draft, Writing – review & editing. OA: Writing – review & editing. MC: Writing – original draft. EV: Validation, Writing – original draft. EC: Writing – original draft. DD: Data curation, Methodology, Writing – original draft.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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