Research Article

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Towards Understanding Nomophobia: A Systematic Review of Its Prevalence, Causes, and Effects in Educational Settings

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Abstract

This article analyzes the causes and consequences of excessive mobile device use among university students and its impact on mental health and academic performance through a review of studies published between 2018 and 2023. Articles were selected from Scopus and Web of Science databases that included "nomophobia" and "education" in the title, abstract, or keywords, and that were open access. The final analysis included 30 articles organized into 14 thematic categories. The most addressed topics were consequences, causes, levels, and factors that determine nomophobia. It was found that excessive mobile device use is mainly due to the constant need to stay connected and the fear of missing out on social media information. This technological dependence manifests in symptoms such as anxiety, stress, nervousness, and physical health problems, such as thumb and wrist pain, visual fatigue, and sleep disturbances. Nomophobia negatively impacts academic performance by interfering with the attention and concentration necessary for learning. Although educational technology does not seem to be a risk factor, it is crucial to promote a balanced use of mobile devices. Family intervention and education on the risks of excessive mobile use are essential to mitigate these effects and foster healthy technology use.

Keywords: *Nomophobia, Mobile devices, Internet, Social media, Technology*

1. Introduction

Nomophobia, a term derived from "no-mobile" and "phobia," refers to the pathological fear of being without access to mobile devices, such as cell phones or tablets (Amar & Sánchez, 2022; Essel et al., 2022; Moreno-Guerrero et al., 2020). This disorder generates extreme anxiety when individuals cannot use their mobile devices.

In the digital era, smartphones have increasingly become an extension of ourselves, making

nomophobia a globally relevant and concerning phenomenon (Amar & Sánchez, 2022; Buctot et al., 2021; Darvishi et al., 2019; Roig-Vila et al., 2020). This dependence has raised significant concerns, as it affects people of all ages and cultural backgrounds (Luy-Montejo et al., 2020). Recent data reveal that the prevalence of nomophobia among university students varies significantly across different regions. For example, in Europe, the prevalence of severe nomophobia in Germany is 3% (Tuco et al., 2023). In Asia, Indonesia and Thailand report prevalences of 71% and 76.1%, respectively, with moderate nomophobia being the most common (59.6%) (Denprechavong et al., 2022; Tuco et al., 2023). In Pakistan and Turkey, significant differences were found in nomophobia scores among students, though specific prevalence rates were not provided (Ozdemir et al., 2018). In Bangladesh, the prevalence of nomophobia was reported as 9.4% for mild, 56.1% for moderate, and 34.5% for severe nomophobia (Al-Mamun et al., 2023). In Vietnam, an extremely high prevalence of 99.9% was reported, with 23.7% experiencing severe nomophobia (Nguyen et al., 2024). In Saudi Arabia, among physiotherapy students, the prevalence was 98.4%, mostly at a mild level (Aldhahir et al., 2023). In Peru, medical students report a prevalence of moderate nomophobia of 25.7% and 7.4% for severe nomophobia (Copaja-Corzo et al., 2022). These statistics highlight how widespread nomophobia is among students globally, emphasizing the need for targeted intervention strategies to address its potential consequences on mental health and academic performance.

Cultural factors also play an important role in the manifestation of nomophobia. Various studies have shown that the prevalence of nomophobia varies significantly among students from different countries. For instance, in Ghana, high levels of nomophobia were observed among university students, which correlated with greater smartphone usage. Similarly, in Sri Lanka, a significant percentage of students exhibited moderate to severe nomophobia, influenced by cultural factors such as gender and educational level (Essel et al., 2021; Liyanaarachchi et al., 2023). Moreover, the cultural adaptation of evaluation tools, such as questionnaires used to assess nomophobia, has been crucial. A study conducted in Colombo, Sri Lanka, highlighted the need to account for cultural nuances when assessing this phenomenon (Liyanaarachchi et al., 2023). Gender differences also played a significant role in nomophobia levels, with women in some cultures experiencing higher levels of nomophobia than men, as observed in studies conducted in various regions (Al Ali & Matarneh, 2024; Ergin & Ozer, 2023). In terms of academic impact, studies from Oman found a correlation between severe nomophobia and poor academic performance, suggesting that cultural attitudes toward education and technology use could mediate this relationship (Qutishat et al., 2020). Comparative studies between countries like Spain and Portugal further revealed that cultural differences could lead to varying levels of anxiety related to smartphone use, with Portuguese students showing higher levels of nomophobia than their Spanish counterparts (Gutiérrez-Puertas et al., 2019).

These cultural variations and their impact on academic performance further highlight the need to understand the long-term effects of nomophobia on mental health and academic success. In this context, concerns have increasingly emerged regarding the long-term effects of nomophobia on students' mental health and academic performance. However, most studies to date have employed cross-sectional designs, limiting the ability to fully understand these long-term effects. Existing research has shown that nomophobia is significantly associated with higher levels of anxiety and depression among students, but the long-term trajectory of these mental health issues remains unclear (Abukhanova et al., 2024; Copaja-Corzo et al., 2022; Yigit et al., 2024). In terms of academic performance, nomophobia has been found to negatively affect results, primarily mediated by anxiety (Abukhanova et al., 2024). Nevertheless, the sustained impact of nomophobia on academic performance has not been well documented. Furthermore, high rates of nomophobia have been identified among students, with key predictive factors including the number of hours spent using smartphones and the frequency of device checking (Daei et al., 2019; Nguyen et al., 2024; Schwaiger & Tahir, 2020). Longitudinal studies would help better understand how these factors evolve over time and how they influence student well-being. In light of this need, some cross-sectional studies suggest that early intervention strategies could help mitigate the negative effects of nomophobia on mental health and academic performance (Copaja-Corzo et al., 2022; Yigit et al., 2024), although longitudinal

studies are needed to validate and refine these strategies. Additionally, there is a recognized need for educational programs and policies aimed at promoting responsible smartphone use and addressing the issue of nomophobia (Daei et al., 2019; Schwaiger & Tahir, 2020) .

Given the widespread prevalence of nomophobia, it is crucial to explore not only its negative consequences but also how educational strategies can be leveraged to mitigate its effects. The role of educational technology emerges as a key factor in this context. While some might view technology as a contributing factor to nomophobia, it can also be used constructively within educational environments to promote healthier habits. Previous research has shown that the implementation of the Good Behavior Game was well-received by both teachers and students, who reported significant improvements in participation and a calmer, more collaborative environment (Hernan et al., 2019). Similarly, the Clear Box approach provided a clear structure that helped students visualize and plan their tasks, promoting personal organization and reducing dependence on electronic devices (Carroll et al., 2021). Additionally, connecting learning with real-world applications through mobile technologies made the content more relevant and engaging for students, reducing anxiety associated with constant use of mobile devices for non-academic purposes (Vincent-Layton, 2015, 2019). The adoption of Web 2.0 technologies to create interactive and participatory learning experiences also helped maintain student interest and engagement, decreasing the likelihood of anxiety due to non-academic mobile use (Parry et al., 2020). These examples highlight how educational technology, when used appropriately, can foster an engaging learning environment that alleviates some of the anxieties associated with mobile device overuse, thereby presenting a more balanced perspective on its role in educational settings.

Recent research has highlighted the relationship between nomophobia and addictive behaviors toward technology, with symptoms similar to traditional addictions, such as nervousness, sweating, tremors, and palpitations when individuals are separated from their devices (Isidro de Pedro & Moreno, 2018).

The World Health Organization (2020) has recognized nomophobia as a public health issue, linked to mental health problems such as anxiety, depression, and sleep disorders. This constant connection to smartphones, coupled with cultural pressures and social expectations interferes with interpersonal relationships, academic and work performance, and mental health (Anjana et al., 2021; Buctot et al., 2021; Sulistiyani et al., 2022).

Nomophobia is closely linked to addictive behavior toward technology, manifesting in the compulsive need to check phones, the inability to disconnect, and the fear of missing relevant information (Anjana et al., 2021; Gajdics & Jagodics, 2022; Modesto et al., 2022). Researchers assert that the lack of control over mobile phone use causes extreme anxiety during disconnection. Additionally, social impact, peer pressure, and fear of exclusion are considered social triggers of this phenomenon called nomophobia (Celikkalp et al., 2020).

The constant search for instant gratification through digital connectivity can exacerbate the anxiety associated with disconnection (Gajdics & Jagodics, 2022). In this context, where excessive smartphone use manifests in various forms such as phubbing (ignoring people to attend to mobile technology) (Santana-Vega et al., 2019), autophobia (fear of being alone), and FoMO (fear of missing out on social media information) (Ríos-Anciani et al., 2022), this article aims to identify the main causes and consequences of excessive mobile device use among university students and its impact on mental health and academic performance. This study is based on a review of studies published between 2018 and 2023, answering the question: What are the most common causes of excessive mobile device use among university students, and how does this use impact their mental health and academic performance according to the scientific literature of the past five years?

2. Methodology

This study is a descriptive bibliographic review focused on the variable Nomophobia (N). Various scientific articles were used as primary information sources, selected from searches conducted in the

Web of Science and Scopus databases. These databases are renowned for their strict quality guidelines, ensuring the reliability of the scientific content. Additionally, the information is meticulously organized, allowing access to multidisciplinary, relevant, updated information with an international perspective.

2.1 Bibliographic selection

For the bibliographic selection in the mentioned databases, three criteria were considered: two inclusion criteria and one exclusion criterion. The inclusion criteria were: 1) articles that included the words "nomophobia" and "education" in the title, abstract, or keywords, and 2) open access articles. The exclusion criterion was: 3) articles published between 2018 and 2023.

Based on these criteria, the following search formulas were generated for Scopus and Web of Science, respectively: 1) (TITLE-ABS-KEY(nomophobia) AND TITLE-ABS-KEY(education)) AND PUBYEAR > 2018 AND (LIMIT-TO(DOCTYPE, "ar")) AND (LIMIT-TO(OA, "all")) and 2) https://www.webofscience.com/wos/woscc/summary/ccde7e94-00a9-4598-afb7-621eda30bf7a-9e0c46df/relevance/1.

Applying the search formulas yielded 54 documents for analysis. The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) criteria, published in 2009 and updated by the PRISMA 2020 statement, were used to transparently document the purpose of the research, the authors' actions, and the findings. This method enabled the identification, selection, evaluation, and synthesis of the consulted sources as follows:

Out of the 54 identified articles, duplicate records were first identified and discarded, eliminating 20 articles and leaving 34 articles for further review. Subsequently, the remaining 34 articles were examined, and after reading the titles, keywords, and abstracts, 4 records were removed for not being directly related to "nomophobia," resulting in a total of 30 articles. These 30 scientific articles were read in full, and upon completing the reading, 4 additional sources were excluded: 2 due to lack of access and 2 because nomophobia was not the primary focus of the study, despite being mentioned in the content. Finally, 4 articles cited by the selected studies were incorporated into the information pool to enrich the obtained content. Thus, after applying the PRISMA method, 30 scientific articles formed the information base for this systematic review (see Figure 1).

2.2 Categorization of Topics, Proposals, and Contributions

For this research, 30 articles were analyzed and organized by topics, proposals, and contributions. For example, the study by (Rodríguez-Sabiote et al., 2020) on “levels of nomophobia in university education students and their relationship with demographic variables such as gender, year of study, degree, and age to determine a profile of the nomophobic student” was categorized under “levels of nomophobia associated with different variables.” Consequently, topics directly associated with “levels of nomophobia associated with different variables” were classified under this category.

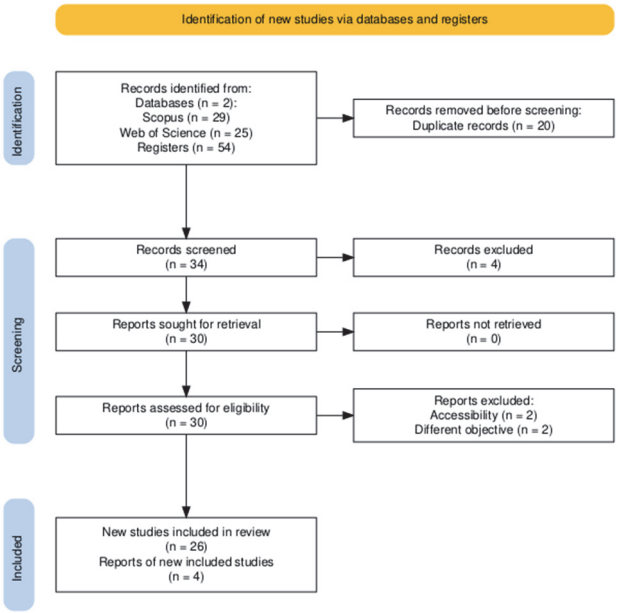

Figure 1. PRISMA diagram. Screening of articles

Regarding proposals and contributions, these were also grouped into categories and ordered according to their frequency of occurrence. For instance, Amar & Sánchez (2022) suggested that working with families to mitigate nomophobia or mobile phone attachment, and improving educational institutions' actions regarding mobile use, should be prioritized. This proposal was categorized as "Importance of parental control and working with families to mitigate nomophobia." Finally, the topics and proposals/contributions resulting from processing the information obtained from the 30 articles extracted from the Web of Science and Scopus databases were organized into a bar graph and a frequency table for proposals and contributions, respectively.

2.3 Research Methodology Employed by the Consulted Scientific Articles

Regarding the research methodologies used by the authors of the selected scientific articles, it was observed that the most utilized approaches and designs were quantitative, including cross-sectional, descriptive, comparative, and correlational methods (see Figure 2).

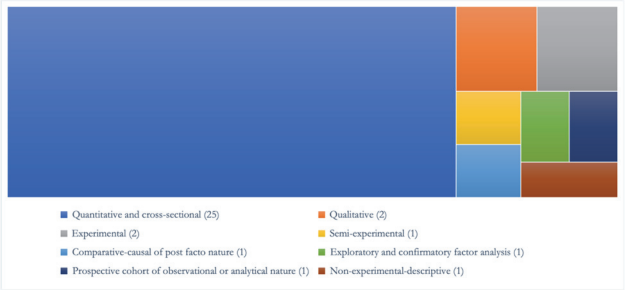

Figure 2: Types of research of the sources consulted.

Additionally, it was observed that the analyzed works originated from various countries including Iran, India, Ghana, Turkey, Tunisia, Sweden, Peru, Pakistan, Indonesia, Hungary, Greece, the Philippines, Italy, and Brazil; however, in more than ten articles, the samples were from Spain, as shown in Figure 3.

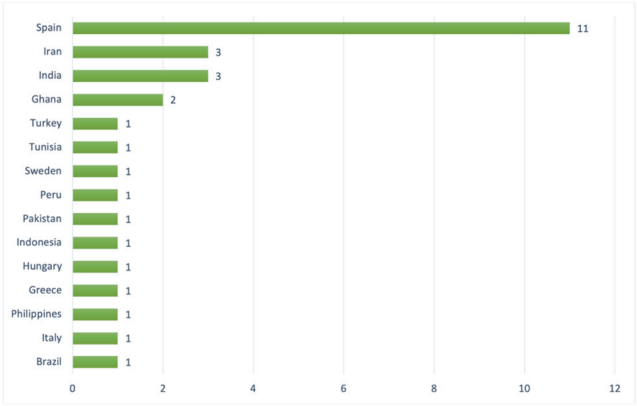

Figure 3: Places of origin of the samples of the scientific articles consulted.

Regarding the research instruments used by the investigators, the most employed was the Nomophobia Questionnaire (NMP-Q), developed by Yildirim & Correia (2015) in English. This questionnaire has been adapted and validated in various languages: into Spanish by González-Cabrera et al. (2017), into Persian by Lin et al. (2018), into Italian by Adawi et al. (2018), into Tamil in India by Mallya et al. (2018), and into European Portuguese by Galhardo et al. (2020). Additionally, Table 1 details the diversity of instruments applied in nomophobia studies.

Table 1: Instruments used in the selected scientific articles.

N°	Instruments	Purpose of the instrument	Applications
1	Nomophobia Questionnaire (NMP-Q)	Levels of nomophobia	28
2	Forum	Perception about nomophobia	1
3	Hopkins Symptom Checklist-25 (HSCL-11)	Determine depression and anxiety	1
4	Mental Health Inventory (MHI)	General emotional functioning	1
5	Brief COPE Scale	Individual differences in coping responses	1
6	J.R. Stroop Test (1935) color and word test	Detection of neuropsychological problems and brain damage	1
7	Raven's Progressive Matrices	General human intelligence and abstract reasoning, seen as a measure of fluid intelligence	1
8	Perceived Academic Self-Efficacy (EAPESA)	Students' judgments about their capacity and means to perform a task and achieve goals successfully	1
9	UCLA Loneliness Scale	Feeling of loneliness	1
10	Social Phobia and Anxiety Inventory (SPAS-7)	Level of anxiety	1
11	Ad hoc scale adapted from other standardized instruments	Measure dimensions related to the use of information technologies and addictive behaviors	1
12	Rosenberg Self-Esteem Scale (RSES)	Self-esteem	1
13	MPPUS: Mobile Phone Problem Use Scale	Problematic mobile phone use	1

N°	Instruments	Purpose of the instrument	Applications
14	Mobile Attachment Questionnaire (Konok et al., 2017)	Attachment to mobile phone use	
15	Spielberger State-Trait Anxiety Inventory (STAI-S)	Attention and feeling of learning during classes	1
16	Specific designed questionnaire	Consumption habits, daily routines, level of dependence	1
17	Smartphone Addiction Scale (SAS-V)	Mobile phone addiction	1
18	Communication Skills Scale (EHC)	Communication skills in healthcare professionals	1
19	Problematic Use of New Technologies Questionnaire (UPNT)	Problematic use of new technologies	1
20	Mobile-Related Experiences Test (CERM)	Mobile-related experiences	1
21	Spanish adaptation of the FoMO-E questionnaire	Frequency of social media use over a week at different times of the day	1
22	Inventory of Parent and Peer Attachment (IPPA)	Evaluations made by the subject about past and present attachment experiences and family functioning	1
23	Sleep Questionnaire (Karolinska Sleepiness Scale [KSS])	Sleep disorders	1
24	PRIME-MD Depression Evaluation	Depression	1
25	Karasek and Theorell Social Support Questionnaire	Work stress, relationship between work demands and decision-making autonomy	1

Amar & Sánchez (2022) conducted a qualitative study using a forum as their instrument. Copaja-Corzo et al. (2022) applied the Hopkins Symptom Checklist-25 (HSCL-11), which evaluates the presence of anxiety and depression. Anjana et al. (2021) used the Mental Health Inventory (MHI) to assess overall emotional functioning and the Brief COPE scale to evaluate coping responses. Schwaiger & Tahir (2020) employed the J.R. Stroop test 1935, a color and word test used to evaluate both simple and complex attention in students, as well as the Raven's Progressive Matrices 2014 to measure non-verbal fluid reasoning, which is affected by cell phone use. All of these studies utilized a cross-sectional quantitative research design.

The study by Khosravi et al. (2021) utilized a quasi-experimental design. They conducted a randomized controlled trial and a pre-post follow-up group design (control and intervention groups), applying the Nomophobia Questionnaire and the Self-Efficacy in Academic Settings Questionnaire (EAPESA). Kılınç et al. (2022) employed the UCLA Loneliness Scale (University of California at Los Angeles) to assess feelings of loneliness as an additional instrument, and Alkalash et al. (2023) used the Social-Physique Anxiety Scale (SPAS-7), which consists of 7 items measuring anxiety levels.

The research conducted by Úbeda Sánchez et al. (2022) was comparative-causal of a post-facto nature and utilized an ad hoc scale adapted from other standardized instruments to measure dimensions related to the use of information technologies and addictive behaviors. Meanwhile, Jelleli et al. (2023) conducted an exploratory and confirmatory factor analysis.

Vagka et al. (2023) used the Rosenberg Self-Esteem Scale (RSES), and Roig-Vila et al. (2020) applied the Mobile Phone Problem Use Scale (MPPUS), which measures addictions and includes 27 items related to social problems derived from mobile phone use, usage patterns, consumption, and motivations. It also includes items related to tolerance, withdrawal, loss of control, avoidance, desire, and negative consequences for daily life. The research design they employed was non-experimental descriptive.

Gajdics & Jagodics (2022) conducted an experimental study that consisted of two phases: one regular school day with cell phone use and a week later without the use of their mobile devices. They used the following instruments in their research: the Mobile Attachment Questionnaire, which includes 14 statements about seeking proximity, separation anxiety, the mobile phone as a safe base and haven, and the need for continuous contact with others through the mobile phone. For the

regular day and the day without a mobile phone, they used the Spielberger State Anxiety Inventory (STAI-S) and created a 12-item questionnaire to measure class participation, including being active, paying attention, and the sensation of learning during lessons.

The research design of González-Cortés et al. (2020) was experimental, both qualitative and quantitative. The objective was to analyze young people's perceptions of cell phone use, their smartphone consumption, and their degree of mobile dependency based on a digital disconnection experience. They designed a specific questionnaire that included both Likert scales and multiple-choice questions related to consumption habits and daily routines, as well as dependency levels.

Celikkalp et al. (2020) used a smartphone addiction scale, the Mobile Phone Addiction Test (SAS-V), and the Communication Skills Scale (EHC), an instrument for evaluating communication skills among different healthcare professionals. Garrote-Rojas et al. (2018) applied a questionnaire on problematic use of new technologies (UPNT), and Santana-Vega et al. (2019) used a mobile-related experiences test (CERM), the Spanish adaptation of the Fear of Missing Out questionnaire (FoMO-E), as well as the Inventory of Parent and Peer Attachment (IPPA).

Thomée et al. (2011)conducted a prospective study, which is an observational and analytical research. The study group answered a questionnaire at the beginning of the study and after a year of follow-up. They used a sleep disorder questionnaire (adapted from the Karolinska Sleepiness Scale [KSS]), a depression evaluation form (PRIME-MD), and a social support questionnaire.

3. Results

In this article, it was considered pertinent to present the results through two elements. The first is a bar graph illustrating the different categories obtained from the variety of topics covered in the analyzed studies, and the second is a frequency table reporting on the proposals and/or contributions of the analyzed documents.

3.1 Main Research Topics on Nomophobia

From the analysis of the articles, a total of 14 categories were generated from the identification of the topics covered, grouping the 30 articles. Figure 4 details the different categories addressed by the studies, as well as the number of articles grouped in each category.

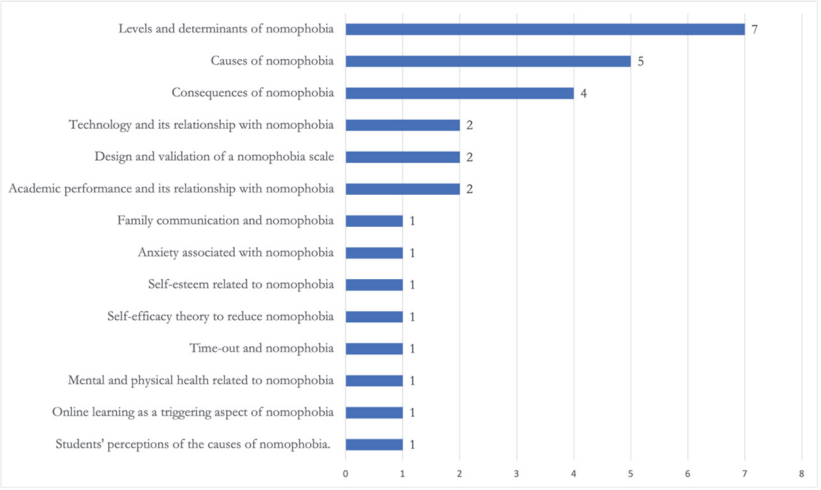

Figure 4: Categories and frequencies obtained from the nomophobia research topics.

To explain in detail the results related to the research topics, we will start explaining Figure 4 from the bottom bar, that is, beginning with the categories that group the fewest number of articles. It is also pertinent to note that the "greater number of articles grouped" does not necessarily indicate higher relevance.

The 1st category, "students' perception of the causes of nomophobia," was reported in one article. This study aimed to analyze and interpret the opinions and feelings of a group of Education university students regarding nomophobia to determine the reasons for this attachment and the importance of understanding it in their future professional activities (Amar & Sánchez, 2022). In this study, most students were unaware of the concept of "nomophobia"; however, they acknowledged the existence of a social dependency on mobile devices. Although they defined it as an undeclared illness, most did not recognize themselves as addicted to their mobile phones. Nevertheless, as future educators, they were sensitive to the impact nomophobia could have on health and indicated the need to discuss the risks of overuse or misuse of mobile phones, especially with future professionals responsible for caring for minors.

The 2nd category, "online learning as a trigger for nomophobia," was studied by Sulistiyani et al. (2022). The majority of respondents exhibited a high level of nomophobia; students reported feeling uncomfortable when they could not access connectivity or use their smartphones as they wished. They also showed a significant dependence on cell phones and other devices. The researchers concluded that one of the triggers of nomophobia is online learning, as all processes were conducted through digital means, which also negatively impacted students who did not initially show signs of nomophobia.

The 3rd category, "mental and physical health related to nomophobia," was analyzed in an article by Anjana et al. (2021). They demonstrated that excessive cell phone use is associated with fatigue, dizziness, headaches, and sleep disturbances, as well as disorders related to cell phone dependency. This dependency creates a physical and emotional bond with cell phones, leading to increased anxiety in students when they are separated from their devices.

Moreno-Guerrero et al. (2020) investigated the 4th category, "time-out and nomophobia." The researchers analyzed the prevalence of nomophobia and its impact on students' rest time. They reported a higher incidence of nomophobia when students sacrificed rest time for mobile phone use, a disorder that elevates levels of nervousness, fear, or anxiety.

The 5th category, "self-efficacy theory to reduce nomophobia," was addressed by Khosravi et al. (2021) They specified that self-efficacy theory, which is the ability of a person to succeed in specific situations and achieve goals, tasks, and challenges, would promote the optimal use of smartphones among students with nomophobia.

The 6th and 7th categories, "self-esteem related to nomophobia" and "anxiety associated with nomophobia," respectively, were each addressed by a single article. Vagka et al. (2023) indicated in their research that students with low self-esteem exhibited higher levels of nomophobia. On the other hand, Gajdics & Jagodics (2022) reported an increase in anxiety due to the absence of mobile phones. Their study observed that anxiety levels increased on school days without mobile phones among students who are usually connected to social networks. Therefore, they concluded that attachment to mobile phones is a generator of nomophobia. Additionally, students experienced negative feelings when separated from the online world. However, they noted that prohibiting mobile phones in schools could increase anxiety and discourage the educational use of modern technology.

The 8th category, "family communication and nomophobia," was studied by Santana-Vega et al. (2019). The researchers indicated that students who used their mobile phones for fewer hours had better parent-child communication. The students themselves noted that their communication with their parents improved when they spent less time using their mobile phones.

The 9th, 10th, and 11th categories were each addressed by two articles. The 9th category, "academic performance and its relationship with nomophobia," was studied by Buctot et al. (2021), who examined differences among students with low, medium, and high academic performance in terms of their personal profiles, family environment, smartphone use, and nomophobia. They

determined that problematic cell phone use affects students' perceptions of their academic performance. Similarly, Schwaiger & Tahir (2022) evaluated the impact of nomophobia on university students' academic performance during tasks requiring non-verbal reasoning and simple and complex attention. They concluded that nomophobia impacts non-verbal fluid intelligence and simple attention due to the fear of being without a smartphone; in other words, cell phones negatively influence complex attention tasks, working memory, and other cognitive areas such as reasoning ability. The impact of nomophobia on students' simple attention is evident when they perform tasks that require attention, such as listening to lectures, taking notes, and taking exams.

The 10th category, "design and validation of a nomophobia scale," focused on demonstrating the reliability of the scale and ensuring it is adapted to a specific context. The first of the two articles in this category was by López et al. (2023), who highlighted the importance of the reliability of a nomophobia scale in producing valid scores and the need to design a nomophobia scale that fits the cultural context of people in a particular country, due to differences in technological behaviors. The second article was by Jelleli et al. (2023), who investigated the importance of using a nomophobia scale adapted to a specific context. They indicated that the Arabic version of the nomophobia questionnaire is a reliable, valid, and appropriate psychometric tool for assessing this pathology in Arabic-speaking Tunisian populations. In their study, the values from the confirmatory factor analysis and the internal consistency indices of the four factors demonstrated good scale consistency.

The 11th category addresses "technology and its relationship with nomophobia." Úbeda Sánchez et al. (2022) describes that the use of new technologies leads to a tendency toward nomophobia; their research aimed to clarify the existence of nomophobia and determine if there are statistically significant differences in the use of the Internet, mobile phones, television, and video games among students from two faculties of Education: Primary and Early Childhood at the Universities of Almería and Granada. On the other hand, in the research by Modesto et al. (2022), it is stated that there is a prevalence of nomophobia among university students who were engaged in remote learning during the pandemic. They identified that the predictors are the use of smartphones, the Internet, and social networks. They assert that there is no significant relationship between nomophobia and the intensity of contact with information technologies for educational purposes; however, they identify high levels of technology use for visiting social networks and communication through instant messaging. Finally, they conclude that the greater the contact with technology, the higher the level of nomophobia, except for educational purposes.

Next, the most extensively studied categories by the researchers are described, which are the 12th, 13th, and 14th, covering the topics of "consequences, causes, levels, and factors of nomophobia."

Regarding the 12th category, "consequences of nomophobia," it was studied in four articles. In the research by Darvishi et al. (2019), they describe that nomophobia causes physical and psychological damage such as anxiety, stress, fear of being without a phone, frustration, insistence, depression, expectancy, persistence, dependency, low self-confidence, poor educational performance, obsessive thoughts, and behaviors. On the other hand, Thomée et al. (2011) mention that the consequences of excessive cell phone use include stress, sleep disorders, symptoms of depression, mental overload, a constant feeling of never being free, role conflicts, and feelings of guilt due to the inability to return all calls and messages. In the article by Alkalash et al. (2023), the researchers describe psychophysiological effects in nomophobic students such as stress and anxiety due to the absence of a smartphone, affecting the conduction speed of the median nerve (movement and sensitivity of the hand). Additionally, clinical manifestations include pain in the thumb and wrist, visual fatigue, lack of sleep, headaches, earaches, and common behavioral manifestations such as feeling nervous, stressed, and unable to handle irritability. Finally, Celikkalp et al. (2020) report in their study the negative impact on the social and educational lives of nomophobic individuals. Excessive cell phone use causes falls or injuries from looking at the device, eye strain and dryness, insomnia, musculoskeletal disorders, reduced physical activity, and decreased learning efficiency in students.

The 13th category corresponds to the "causes of nomophobia," which has been investigated in

five articles. Roig-Vila et al. (2020) relate that excessive smartphone use and the need to interact are triggers for nomophobia, indicating that the smartphone is the most used device by students for socializing, as well as a means to avoid loneliness and constantly visit social networks. They assert that while there is a necessity for smartphones in learning, they must be appropriately integrated into classrooms, anticipating the risks that excessive use can cause and leveraging their potential for collaborative knowledge construction. In the study by Essel et al. (2022), the focus is on understanding the causes of nomophobia and its relationship with access to information and communication. González-Cortés et al. (2020) point out that mobile phone usage amounts to approximately 30 hours per week due to the need to check social networks, with Facebook being the primary medium used to stay informed via the Internet, followed by Twitter (now known as X), YouTube, and WhatsApp. They explain that there is a recognition of the dominance that mobile phones have in their lives versus the inability to voluntarily reduce mobile phone consumption time.

Another article in this category is by Essel et al. (2022), who evaluate the prevalence of nomophobia among university students in Ghana, the sociodemographic variables, and their association with academic performance. They noted a high prevalence of nomophobia as smartphone use increases, affirming the influence of smartphones on people's well-being and their adaptation to the environment. Lastly, Garrote-Rojas et al. (2018) indicates that the reasons for constant mobile phone use include the need to stay connected and because it is a tool that relaxes them, leading to problems such as the inability to disconnect, lying to their closest circle about the time they spend on it, and dependency due to the frequent need to check their mobile phone.

Finally, seven articles addressed the 14th category, " levels and determinants of nomophobia," which became the most studied category by researchers. In this regard, Rodríguez-Sabiote et al. (2020) investigated the profiles of nomophobic students and their relationship with demographic variables such as gender, year of study, degree, and age, providing information about how nomophobia levels relate to these variables. They identified the following profiles: The first group consists of students with a low level of nomophobia, associated with first-year master's students over 24 years old, where gender does not play a discriminatory role. The second group describes students with moderate nomophobia, associated with women, bachelor's degrees in Pedagogy and Primary Education, first or second-year students, and ages between 21 and 24 years. Finally, the third group consists of students with high nomophobia, sharing the same characteristics as the previous group but typically aged between 17 and 20 years. Copaja-Corzo et al. (2022) studied the levels and factors of nomophobia in Peruvian university students of Human Medicine and their associated factors. They evaluated the degrees of nomophobia related to factors such as gender, age, mobile internet data, cell phone use, smartphone use primarily for education, social networks, entertainment, anxiety, and depression. Older students had lower nomophobia scores, and higher nomophobia scores were associated with the frequency of cell phone use. Daei et al. (2019) also studied prevalent factors in nomophobia and their significant relationship with gender, age group, and education level. They concluded that there is a relationship between cell phone use and the increase in nomophobia disorder.

In the study by Kılınç et al. (2022), the levels of nomophobia, conditioning factors, and their relationship with loneliness were evaluated among high school students in a rural region of Turkey. They indicated that high daily use of a smartphone, frequently checking the phone, and having more friends on social networks than in real life are associated with the highest levels of nomophobia. Nomophobic traits are often presented by conditioning factors such as frequently checking the phone, avoiding places where mobile phone use is prohibited, not turning off the phone throughout the day, and preferring to communicate via smart devices. In the article by Roig-Vila et al. (2020), the objective was to understand the nomophobic profile and identify possible problematic uses of smartphones among Spanish and Italian university students. Spanish students recognized more negative behaviors such as phubbing, nomophobia, and FoMO, the constant need to check notifications, a tendency to ignore the world around them while using their devices, and difficulties in managing the time they spend on their phones. The use of smartphones for their value in

interpersonal relationships was identified as a determining factor of nomophobia, as their characteristics offer the creation of new environments for communication and participation among young people.

Rodríguez-Sabiote et al. (2020) sought to obtain more data about the relationship and influence between levels of nomophobia, age, and the educational stage of students to determine whether this increases users' phobia when they do not have mobile phones. They concluded that there is no defined prevalence of nomophobia for a specific age group and that it can present itself at any level of the various educational stages. They found that neither educational level nor age are determining factors in the presentation of this pathology. Lastly, Anusuya et al. (2021) determined the prevalence, predictors of nomophobia, and mobile phone usage patterns among medical students in Chennai, India. They concluded that the prevalence of nomophobia was 99%; with 17.5% severe, 56.3% moderate, and 25.3% mild. The amount of time spent using mobile phones emerged as the most significant predictor of nomophobia, with severe nomophobia associated with more than 5 hours of mobile use per day. The main reasons were using WhatsApp (95%), YouTube (81.3%), and Instagram (74.3%). Mobile internet usage was high among the medical students.

In summary, it can be indicated that out of the 30 articles analyzed, the most researched topics related to nomophobia were consequences, causes, levels, and determining factors. In contrast, the less researched topics, highlighting gaps in knowledge, included students' perceptions of its causes, online learning as a trigger for nomophobia, mental and physical health related to nomophobia, rest time and nomophobia, self-efficacy theory to reduce nomophobia, self-esteem related to nomophobia, anxiety associated with nomophobia, and family communication related to this disorder.

3.2 Main Proposals and/or Contributions on Nomophobia

Regarding the contributions and proposals, the research yielded a total of 23 categories that contributed to theoretical knowledge, as well as detecting cases of nomophobia and preventing the issue. These proposals and contributions related to nomophobia, obtained from each of the articles, were categorized and classified by their frequency of appearance. Table 2 shows that the frequency of proposals and/or contributions ranges from 1 to 15. Likewise, most researchers indicate that to mitigate nomophobia, "educational institutions should implement counseling to safeguard students' mental health."

Table 2: Frequency of Proposals and Contributions Identified in the Articles

N°	Categories of Proposals and Contributions	Frequency
1	Educational institutions should implement counseling to safeguard students' mental health.	15
2	It is necessary to disseminate the disadvantages and risks of cell phone use.	11
3	Understanding the pattern of the onset of nomophobia will facilitate the prevention of its negative effects.	9
4	Knowing the causes and consequences of excessive cell phone use is important to reduce nomophobia.	8
5	Informing about the determinants of nomophobia.	8
6	Advances in technology and its use are related to new disorders and dependencies among people.	4
7	Implementing early evaluation and intervention strategies to promote students' mental health and coping with nomophobia.	3
8	Including topics related to nomophobia and addiction to technological devices in curricula.	3
9	The importance of parental control and working with families to mitigate nomophobia.	3
10	Frequent cell phone use is a way to escape moments of loneliness, isolation, and stress	2
11	Recognizing, preventing, and avoiding the consequences of nomophobia through a reliable and contextualized scale.	2
12	Applying therapeutic strategies for subpopulations at risk through awareness campaigns.	2
13	The negative influence of cell phones on students' simple attention, working memory, and other cognitive areas such as reasoning ability.	2
14	Conducting periodic evaluations and monitoring of nomophobia in students to obtain more reference information.	2

N°	Categories of Proposals and Contributions	Frequency
15	The need to use an application to monitor the real duration of cell phone use to avoid the low reliability of self-reports in research.	2
16	Banning cell phones in schools may increase anxiety and discourage the educational use of modern technology.	1
17	The integration of technology for educational purposes does not appear to be a risk factor for nomophobia.	1
18	Applying self-efficacy theory as a coping measure to reduce nomophobia.	1
19	Implementing actions to treat mild nomophobia and pharmacological treatment in advanced stages.	1
20	Managing students' free time as a solution to reduce the risks of nomophobia.	1
21	The presence of cell phones reduces the ability to absorb new ideas and think critically about the material presented	1
22	Evaluating the effects of nomophobia on medical performance to ensure patient safety.	1
23	Online learning is a trigger for nomophobia.	1

From Table 2, it can be inferred that most of the research encourages taking preventive measures and planning educational programs to ensure students' health, given the moderate incidence of the nomophobia disorder. Thus, row 1 of Table 2 specifies that the category "educational institutions should implement counseling to safeguard students' mental health" appears 15 times in the analysis. Another category with high frequency, valued at 11, highlights that "it is necessary to disseminate the disadvantages and risks of cell phone use." Therefore, the analyzed research informs about the harms of excessive cell phone use and its relation to health status, as well as the disorders and harmful effects that this dependency produces in people. This issue underscores the importance of enhancing health education strategies in educational institutions.

The category "understanding the pattern of the onset of nomophobia will facilitate the prevention of its negative effects" has a frequency of 9. Information has been accessed regarding the profiles of students and how these relate to levels of nomophobia, which will help identify what nomophobic behavioral patterns people who suffer from it tend to have, thus facilitating psychological or medical attention and intervention.

The categories "knowing the causes and consequences of excessive cell phone use is important to reduce nomophobia" and "informing about the determinants of nomophobia" have a frequency of 8. The research suggests understanding the reasons and effects of nomophobia and being aware of the factors that condition it. Knowing the causes of excessive cell phone use is crucial for teachers when taking action in such situations. The main reasons for excessive use include interacting through WhatsApp, viewing information on YouTube, and using Instagram. Regarding the category "informing about the determinants of nomophobia," various studies repeatedly affirm that the main reasons for acquiring this phobia at its highest level are excessive smartphone use, age as a condition for addiction, career, and academic level.

The category "advances in technology and its use are related to new disorders and dependencies among people" presented a frequency of 4. Researchers mentioned that the most frequent psychological damages from nomophobia are anxiety, depression, obsessions, and obsessive imaginations, among others.

Categories with a frequency of 3 emphasize the need to reduce and detect nomophobia early. Academic institutions play a crucial role in addressing this issue, and they must not ignore it. They also stress the urgency of regulating procedures for attending to cases of nomophobia, from detection to intervention or medical referral if necessary. Additionally, families must be involved since the prevention and eradication of nomophobia should be continuous and encompass all areas, with families playing a prominent role.

Categories with a frequency of 2 document that people experiencing stress or loneliness turn to smartphones to cope with these states. Various studies indicated the need to use a scale that reflects the social context of the research sample to obtain more reliable results. They also suggest broader medical treatments and awareness campaigns, not only within academic institutions and for students. Furthermore, they mention that nomophobia significantly affects academic performance by impacting cognitive processes.

Lastly, the least frequent contributions highlight several important aspects. First, banning cell phones in schools can increase anxiety and discourage the educational use of modern technology, making it crucial to reinforce digital citizenship education and promote advantageous use of technological devices. Additionally, educational technology does not seem to be a risk factor for nomophobia, as it does not generate dependency or negative effects. The self-efficacy theory can be an effective measure to address and reduce nomophobia if users understand the drawbacks of excessive use and manage their use appropriately. It is also useful to create spaces to address nomophobia from its initial stages to advanced cases that may require pharmacological treatment. Managing students' free time is essential to balance cell phone use and avoid dependency, as excessive use can reduce the ability to absorb new ideas and think critically. Moreover, it is important to evaluate the effects of nomophobia on medical performance to ensure patient safety. Finally, it is noted that online learning, especially during the pandemic, has increased the risk of nomophobia due to the excessive use of digital platforms and social networks.

4. Discussion

From the analyzed works, various contributions can be gathered. First, it is essential to understand the diverse causes that provoke this disorder and take preventive measures. Amar & Sánchez (2022) analyzed the opinions of university students to identify the reasons for their attachment to mobile phones, highlighting the importance of disseminating the risks of cell phone use and family intervention to improve the educational use of technology. This need to understand the causes of the disorder coincides with Essel et al. (2022), who pointed out that the obsessive behavior of accessing information and communicating immediately is a significant cause. Additionally, Moreno-Guerrero et al. (2020) identified that sacrificing rest time for mobile use increases levels of nervousness, and Kılınç et al. (2022) detailed that anxiety in nomophobic students is due to thoughts like losing the phone or being out of coverage.

The studies also highlight how levels of nomophobia are related to demographic variables. Rodríguez-Sabiote et al. (2020) found that low levels of nomophobia are associated with students over 24 years old, while the highest levels are detected in students aged 17 to 20. However, Darvishi et al. (2019) indicated that the incidence of nomophobia is lower in women and higher in participants with a higher educational level. Furthermore, Kılınç et al. (2022) noted that factors such as high daily phone use and having more friends on social networks than in real life increase nomophobia.

Regarding technology, Úbeda Sánchez et al. (2022) concluded that most university students use mobile phones for leisure, and Modesto et al. (2022) found no significant relationship between nomophobia and intensive use of technology for educational purposes.

The consequences of nomophobia are multiple. Darvishi et al. (2019) stated that lack of access to a cell phone causes insecurity and various physical and psychological problems, such as anxiety, stress, and low confidence. Alkalash et al. (2023)reported that phone addiction affects physical health, including thumb and wrist pain, and behavioral health, such as nervousness and irritability. These negative effects also influence academic performance, as highlighted by Buctot et al. (2021) and Schwaiger & Tahir (2022), who found that nomophobia affects attention and reasoning ability.

Although the causes, consequences, levels, and determining factors of nomophobia are the most addressed topics, other issues such as the relationship of nomophobia with online learning, self-efficacy theory, and problematic mobile use in family communication are also crucial for detecting and treating this pathology.

5. Conclusions and Recommendations

The excessive use of mobile devices among university students is primarily due to the constant need to stay connected and not miss out on information from social networks. This addictive behavior, characterized by the obsession with accessing information and communicating immediately, is a

determining factor in nomophobia.

The consequences of this excessive use are varied and significant. In the realm of mental health, problems such as anxiety, stress, nervousness, and insecurity are observed when students do not have access to their mobile phones. Additionally, this behavior negatively impacts physical health, causing thumb and wrist pain, visual fatigue, and sleep disturbances.

Academic performance is also affected, as excessive mobile phone use interferes with the attention and concentration needed for effective learning. Mobile phone addiction reduces students' ability to absorb new ideas and think critically about the material presented to them.

On the other hand, although educational technology does not appear to be a risk factor for nomophobia, it is crucial to promote responsible and balanced use of mobile devices. Family intervention and education about the risks of excessive mobile phone use are essential to address this problem effectively.

Nomophobia among university students is mainly caused by the need for constant connectivity and has severe consequences on their mental health and academic performance. Therefore, it is fundamental to implement educational and family strategies to mitigate these effects and promote a healthy use of technology.

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