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Highlights

- A total of 43 studies (n=36,656 participants) from 18 countries were included in the meta-analysis
- The pooled prevalence of nomophobia was 94% (95% CI: 90%-99%)
- One in two participants had moderate nomophobia, and one in five had severe nomophobia
- University students are more likely to be severely affected
- Developing countries have a higher prevalence of nomophobia than developed countries.

The prevalence of nomophobia: A systematic review and meta-analysis

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Abstract

Nomophobia (no mobile phone phobia) is a term used to describe discomfort or anxiety experienced when individuals are unable to use or access their mobile phones. Although not formally recognized in the DSM-5 or ICD-11, nomophobia has gained increasing research attention. The present study systematically reviewed and meta-analyzed the global prevalence of nomophobia, based on 43 studies ($n = 36,656$ participants) from 18 countries. Only studies using validated self-report instruments, primarily the Nomophobia Questionnaire (NMP-Q), were included. Subgroup analysis and meta-regression were conducted to determine the sources of heterogeneity. Results indicate that nomophobia is widespread, with 26% of participants reporting mild symptoms, 51% moderate symptoms, and 21% severe symptoms. Importantly, these figures reflect self-reported levels of distress rather than clinical diagnoses. Higher prevalence was observed among university students and young adults. The wide variation across regions and instruments suggests nomophobia is influenced by cultural, behavioral, and technological contexts. Despite ongoing debates regarding whether nomophobia is an anxiety disorder, these findings highlight the critical need for precise definitions and continued exploration of its psychological correlates.

Keywords: nomophobia; mobile phone dependency; smartphone addiction; NMP-Q; systematic review; meta-analysis

1 Introduction

Nomophobia ('no mobile phone phobia'), is defined as the fear of being without a mobile phone or unable to use it due to the lack of signal, drained battery, or loss of internet connectivity (Bhattacharya et al., 2019). Nomophobia has four dimensions: fear of being unable to interact with others, lost connectedness, worrying about the difficulty in getting information swiftly, and discomfort with not owning a smartphone (Yildirim & Correia, 2015). Although nomophobia is referred to as a 'phobia', it is not officially recognized as a specific disorder in any psychiatric or medical diagnostic text (such as the *Diagnostical and Statistical Manual of Mental Disorders* or the *International Classification of Diseases*). Symptomatically, nomophobia shares features with anxiety disorders, particularly in the form of anticipatory anxiety and panic-like symptoms when individuals are separated from their smartphones (Bhattacharya et al., 2019). Seven characteristics have been associated with the presence of nomophobia, namely long duration of smartphone use, concern about losing smartphone and network coverage, constantly carrying a phone charger, reduced social interaction, frequent calls and/or checking messages, inability to turn the smartphone off for 24 hours, and inflationary trends in the cost and expenses associated with the use of a smartphone (Bragazzi & Del Puente, 2014). Although some of the consequences of nomophobia arguably share similarities with behavioral addictions, nomophobia is not a behavioral addiction. The behavior lacks a reward-seeking pattern and is more driven by fear of disconnection or inaccessibility to mobile phones (Yildirim & Correia, 2015).

Nomophobia appears to disproportionately affect specific groups of people. For example, a higher prevalence of nomophobia was reported among Turkish college students (Yildirim et al., 2016), while another study among university students reported that 20% suffered from mild nomophobia, 15% from moderate nomophobia, and 65% from severe nomophobia (Qutishat et al., 2020). In contrast, a study among medical students reported 32.1% mild nomophobia, 61.5% moderate nomophobia, and 6.1% severe nomophobia (Sethia et al., 2018). In Ghana, the prevalence rates of mild, moderate, and severe nomophobia were 13%, 63.2%, and 23.2%, respectively, among teachers (Essel et al., 2022).

Nomophobia has been associated with stress disorder (Bhattacharya et al., 2019), markedly reduced quality of life (Sharma et al., 2019), hyperactivity and oppositional behaviors (Kuscu et al., 2021), poor academic performance (Ahmed et al., 2019; Rodríguez-García et al., 2020; Wolfers et al., 2020), depressive symptoms (Sharma et al., 2019), poor self-esteem (Servidio,

2021), and disrupted ability to function (León-Mejía et al., 2021). Therefore, it is apparent that nomophobia is associated with substantial potential detrimental consequences across a wide array of social, psychological, and health-related functions, further attesting to the importance of improved understanding of its prevalence and the potential factors associated with the heterogeneity of such prevalence.

Consequently, systematic reviews have been undertaken to synthesize the existing evidence (León-Mejía et al., 2021; Notara et al., 2021; Rodríguez-García et al., 2020), including one previous meta-analytic study that assessed nomophobia (Humood et al., 2021). In contrast to the one prior meta-analysis (Humood et al., 2021), which included a smaller number of studies (i.e., 20 studies from 10 countries) published until January 2021 and often relied on self-developed assessment tools, the present study focused exclusively on studies using validated self-reported instruments and categorized nomophobia by severity. It also explored global trends by including studies across diverse economic regions, providing a more comprehensive and updated analysis of this phenomenon.

2 Methods

2.1 Search strategy

The study followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline (Moher et al., 2010). The protocol was registered with PROSPERO (ID: 364690). The review question was generated based on the Joanna Briggs Institute (JBI) method and the CoCoPop (Condition, Context, and Population). Here the condition was nomophobia, the context was global, and the population was any group(s) in the population. A systematic literature search was carried out in *Ovid* databases (i.e., *Embase*, *Global Health*, *APA PsycInfo*, *Ovid Emcare*, *Ovid Medline*, and *Epub Ahead of Print*), PubMed, and *Web of Science* to include papers that were published up until December 10, 2022. The search keywords were ‘Nomophobia’ OR ‘No mobile phone phobia’ OR ‘Nomophobe’ OR ‘Nomophobic’.

2.2 Inclusion and exclusion criteria

The inclusion criteria were (i) being a cross-sectional study to ensure consistency in prevalence estimation because longitudinal studies primarily assess changes over time rather than prevalence (and almost all of the extant studies estimating nomophobia prevalence are

cross-sectional), (ii) reporting the self-reported prevalence of nomophobia, (iii) using a validated psychometric instrument to assess nomophobia, and (iv) being published in the English language up in a peer-reviewed journal until December 10, 2022. Studies were excluded if they were abstracts, case reports, letters to the editor, commentaries, policy papers, review papers, theses, conference papers, or metadata presentations. It should also be noted that some papers mistakenly equated nomophobia with smartphone addiction and reported the prevalence of nomophobia using instruments assessing problematic smartphone use (Alwafi et al., 2022). Such studies were not included in the meta-analysis.

2.3 Data collection procedure

A total of 385 papers were retrieved from several databases and entered into *Mendeley* reference management software, which automatically removed all duplicate papers (n=10). Then, the 375 papers were screened based on their title and abstract by a pair of the co-authors, FAM and MAM. In case of any discrepancy, it was solved following a discussion in the presence of a third member of the team, MMK. After excluding non-relevant papers, 57 papers were eligible for full-text assessment. Finally, 43 studies were included in the review (Figure 1).

2.4 Data extraction

The first two authors extracted the data using a pre-designed spreadsheet in *Microsoft Excel 2019*. Papers were synthesized based on the author and publication year, country, study design, sampling technique, data collection period, population, mean age, sample size, nomophobia assessment scale, and cutoff and prevalence rate. Any disagreements regarding the data extracted were resolved by consulting with another author on the team (MMK).

2.5 Outcomes

The primary outcome was the estimation of the prevalence of nomophobia. The prevalence of nomophobia was also estimated based on severity categories corresponding to mild, moderate, and severe nomophobia. Mild, moderate, and severe nomophobia was categorized based on the assessment tools used in each study. For example, the cutoff for nomophobia using the NMP-Q was 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe. Detailed information regarding the cut-off used to categorize nomophobia is provided in **Table 1**. The secondary outcome was to find potential reasons for prevalence heterogeneity, and

differences across low- and middle-income countries (LMICs), middle-high income countries (MHICs), and high-income countries (HICs).

2.6 Quality assessment of the included studies

The risk of bias in the included studies was assessed using the Joanna Briggs Institute (JBI) checklist used for prevalence studies (Munn et al., 2015). The JBI uses a four-point Likert scale with answers being “no”, “yes”, “unclear”, or “not applicable”, for the following questions – (1) appropriateness of the sample frame (was the sample frame appropriate to address the target population?); (2) recruitment procedure (were study participants sampled in an appropriate way?); (3) adequacy of the sample size (was the sample size adequate?); (4) description of participants and setting (were the study participants and the setting described in detail?); (5) description of the identified sample (was the data analysis conducted with sufficient coverage of the identified sample?); (6) validity of the methods used to screen for mental health problems (were valid methods used for the identification of the mental health problems?); (7) reliability of the methods used to screen for mental health problems (were the mental health problems measured in a standard, reliable way for all participants?); (8) adequacy of statistical analyses (was there appropriate statistical analysis?); and (9) response rate (was the response rate adequate, and if not, was the low response rate managed appropriately?). Studies were assigned one point for every “yes” answer. Papers with a score ≥ 4 points were considered as good quality.

2.7 Statistical analysis

The random effect model was used to determine the pooled prevalence of nomophobia in light of the diversity of the populations included. The heterogeneity was measured using the Q Cochrane statistic, and the degree of heterogeneity was estimated using the I^2 statistics. Heterogeneity was designated as mild, moderate, severe, and extremely severe for I^2 values of <25%, 25% to 50%, 50% to 75%, and >75%, respectively (Higgins et al., 2003). The findings of meta-analyses are presented using forest plots considering proportion as the effect size with a 95% confidence interval. Subgroup analysis was carried out to examine if nomophobia problems in each group impacted the overall pooled estimate. In the present study, country, population group, and country’s economic status as classified by the World Bank (World Bank, 2023) were used in the subgroup analysis. Results are reported if there were ≥ 3 studies available for the analyses. Meta-regression was conducted utilizing each

study sample size and corresponding quality assessment score. Publication bias was evaluated through funnel plot inspection, Egger's regression test (Egger et al., 1997), and the trim-and-fill method (Duval & Tweedie, 2000). Given evidence of small-study effects, PET-PEESE (Precision-Effect Test/Precision-Effect Estimate with Standard Error) was further applied to adjust for potential bias and estimate true effect size. The jackknife method was used to evaluate each study's effect on the pooled estimate by carrying out a 'leave-one-out' sensitivity analysis (Miller, 1974). All the analyses were conducted using the '*meta*' command in STATA 17 software (StataCorp LLC, College Station, Texas, USA).

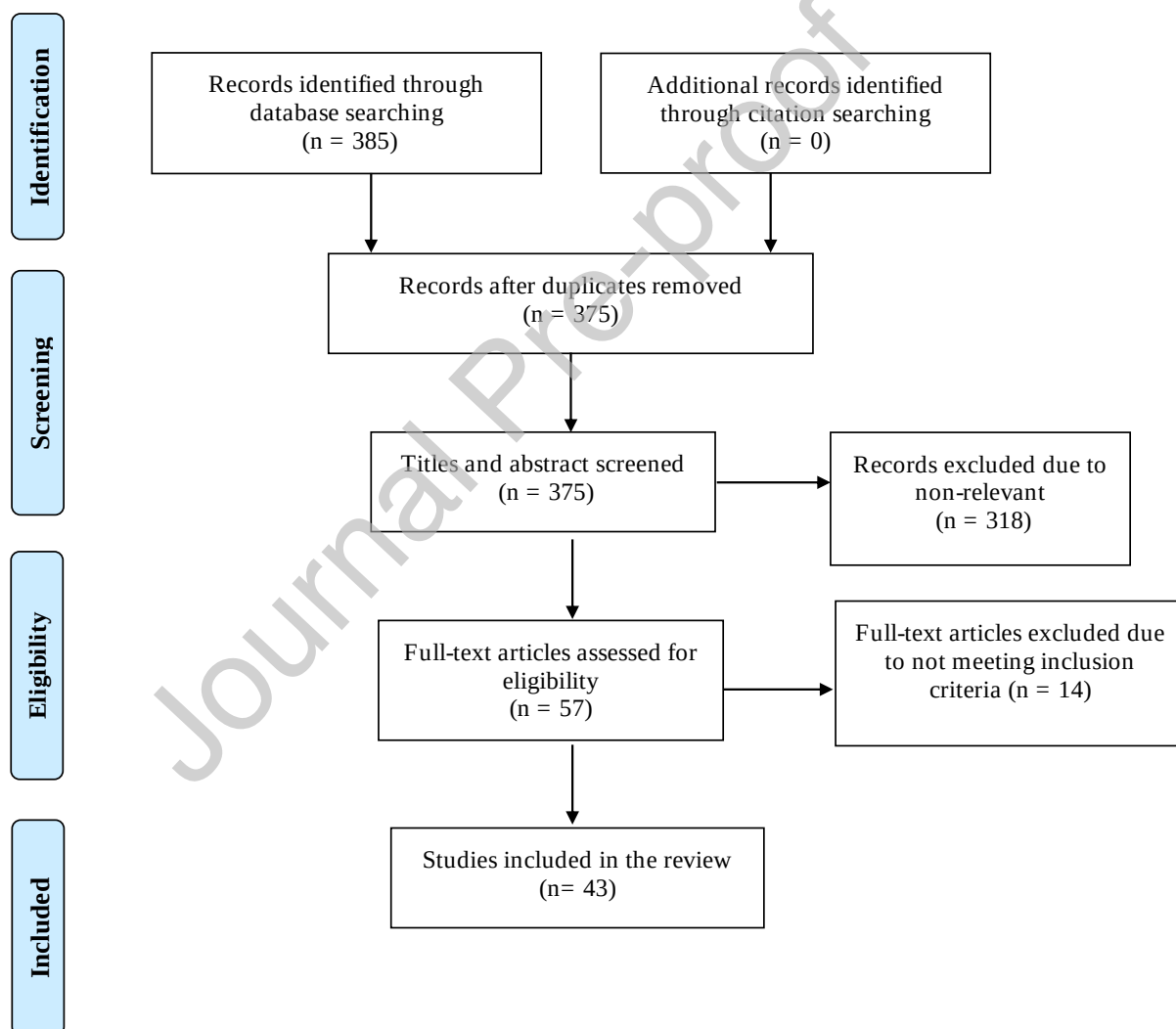


Figure 1: PRISMA flow diagram of the studies included.

[Insert Table 1 here]

Table 1: Characteristics of the studies included.

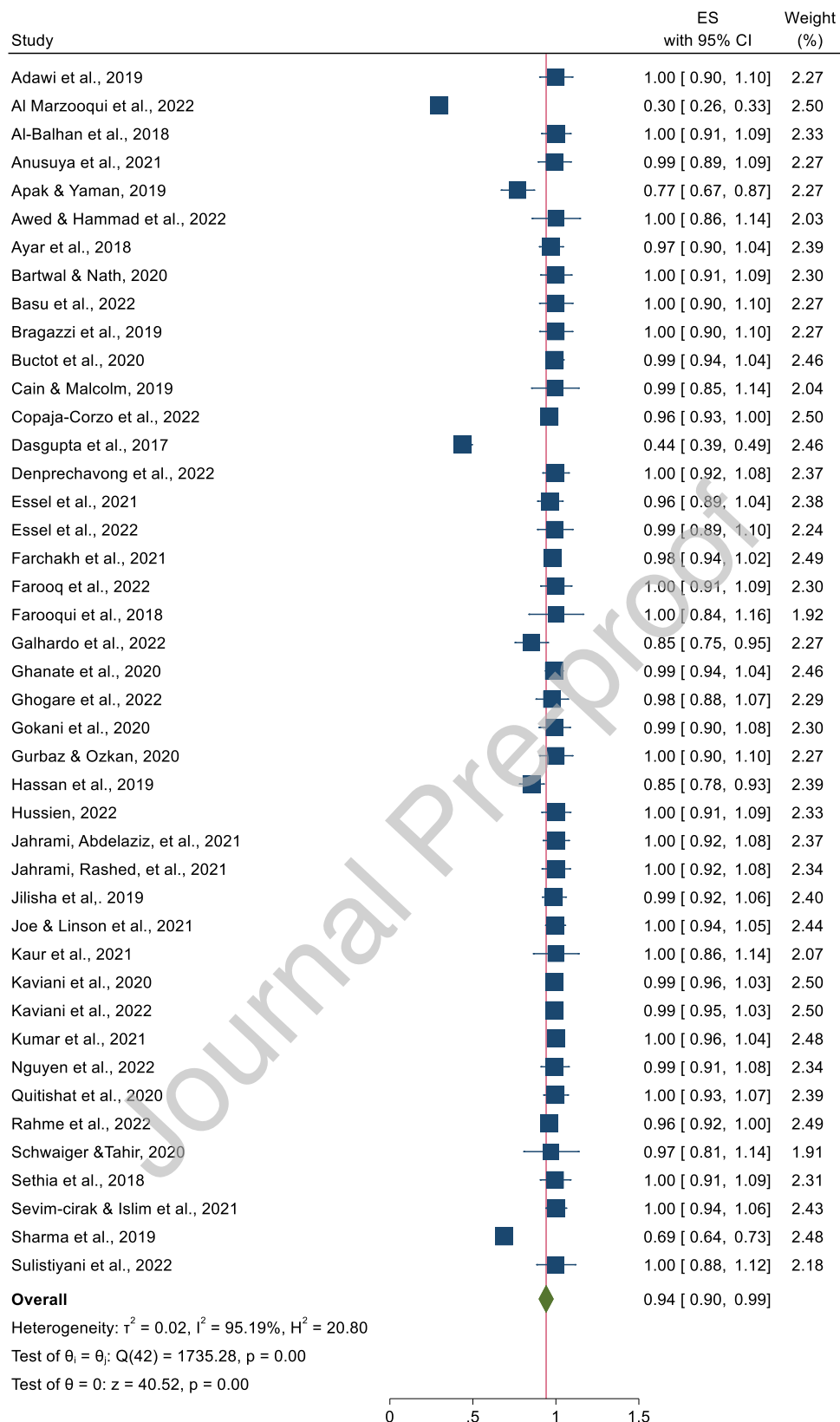
3 Results

3.1.1 Study characteristics

A total of 36,356 participants from 43 studies were included in the meta-analysis. The studies were carried out in 18 different countries. Most of the studies were from India (n=14; 10,305 participants), were conducted among university students (n=10; 4,438 participants), were from LMICs (n=24; 18,915 participants), and used the NMP-Q to assess the prevalence of nomophobia (n=42). The summary characteristics of all the included studies are provided in **Table 1**.

3.1.2 Prevalence of nomophobia

The overall prevalence of nomophobia was 94% (95% CI: 90% to 99%, $I^2 = 95.19\%$) (**Figure 2**). Moreover, the pooled prevalence was 26% for mild nomophobia (95% CI: 21% to 31%, $I^2 = 99.07\%$) [**Figure 3(a)**], 51% for moderate nomophobia (95% CI: 46% to 56%, $I^2 = 96.14\%$) [**Figure 3(b)**], and 21% for severe nomophobia (95% CI: 17% to 25%, $I^2 = 99.08\%$) [**Figure 3(c)**].



Footnote: ES, Effect Size; CI, Confidence Interval

Figure 2: Pooled prevalence of nomophobia across 43 studies

3.1.3 Subgroup analysis of nomophobia

The findings for the subgroup analyses regarding nomophobia are presented in **Table 2**. There were only three countries that had three or more studies estimating the prevalence of nomophobia (i.e., India, Saudi Arabia, and Turkey). The overall prevalence of nomophobia was 93% for India (95% CI: 84% to 100%, $I^2=95.61\%$), 78% for Saudi Arabia (95% CI: 45% to 100%, $I^2 =98.80\%$), and 94% for Turkey (95% CI: 83% to 100%, $I^2 =85.75\%$). There was no significant difference between the sub-groups ($\chi^2 = 14.36$, $p = 0.64$). In terms of economic status, the prevalence was 92% for HICs (95% CI: 81% to 100%, $I^2 =97.09\%$), 95% for LMICs (95% CI: 90% to 100%, $I^2 =93.58\%$), and 95% for MHICs (95% CI: 89% to 100%, $I^2 =81.49\%$). There was no significant difference between the sub-groups ($\chi^2 = 0.30$, $p =0.86$). In terms of population sub-groups, the prevalence was 90% for adolescents (95% CI: 78% to 100%, $I^2 =94.96\%$), 98% for adults (95% CI: 96% to 100%, $I^2 =0.05\%$), 97% for medical students (95% CI: 95% to 100%, $I^2 =0.01\%$), 95% for university students (95% CI: 90% to 100%, $I^2 =65.77\%$), and 99% for young adults (95% CI: 96% to 100%, $I^2 =0.02\%$) ($\chi^2 = 1578.46$, $p < 0.001$).

The prevalence of nomophobia varied significantly across different assessment instruments. Studies using the NMP-Q reported the highest pooled prevalence (94%, 95% CI: 89%–99%), with substantial heterogeneity ($I^2 = 95.34\%$). Test statistics indicated significant differences between instruments for moderate ($\chi^2 = 17.85$, $p < 0.001$) and severe nomophobia ($\chi^2 = 25.08$, $p < 0.001$). Sampling techniques also influenced prevalence estimates. Studies employing snowball sampling reported the highest prevalence (99% [95% CI: 96%–100%, $I^2 = 0\%$]), followed by census-based sampling (98% [95% CI: 93%–100%, $I^2 = 0\%$]), simple random sampling (96% [95% CI: 93%–100%, $I^2 = 51.45\%$]), convenience sampling (95% [95% CI: 88%–100%, $I^2 = 96.05\%$]), and purposive sampling (88% [95% CI: 75%–100%, $I^2 = 92.75\%$]). Significant differences were observed across sampling methods ($\chi^2 = 358.94$, $p < 0.001$). There was a significant difference between the sub-groups (**Table 2**). Detailed information regarding subgroup analyses for mild nomophobia, moderate nomophobia, and severe nomophobia are provided in **Table 2**.

3.1.4 Meta-regression of Nomophobia

Univariate meta-regression indicated that neither sample size nor quality assessment score were significant predictors of overall and moderate nomophobia ($p > 0.05$), but that sample

size was a significant predictor of both mild nomophobia and severe nomophobia ($p < 0.05$) (Table 3).

3.1.5 Publication bias and sensitivity analysis

A funnel plot suggested a probability of publication bias based on the Egger's regression test ($\beta=2.71$, $p = 0.049$). The trim-and-fill adjustment estimated a corrected prevalence of 91.4% (95% CI: 87.8% to 95.1%), suggesting possible underreporting of null-effect studies. The PET regression showed borderline non-significance ($\beta=2.71$, $p=0.056$), indicating small-study effects but not conclusively. The PEESE model was non-significant ($\beta=23.73$, $p = 0.114$), implying limited bias. Adjusted intercepts from PET (83.0% [95% CI: 70.7%–95.3%, $I^2_{\text{res}} = 97.46\%$]) and PEESE (89.5% [95% CI: 82.1%–96.9%, $I^2_{\text{res}} = 97.5\%$]) supported robust estimates. Leave-one-out analysis revealed no single study disproportionately influenced the pooled estimate.

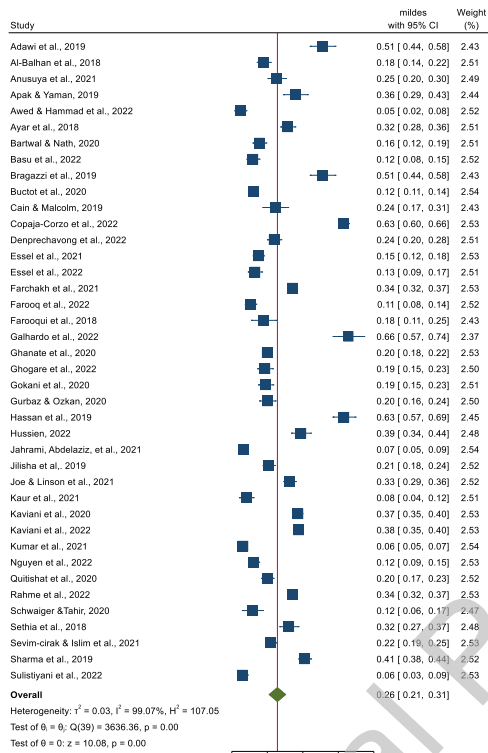
For mild nomophobia, there was strong evidence of publication bias based on the Egger's test ($\beta=8.86$, $p = 0.0007$). After using the trim-and-fill technique the adjusted prevalence of mild nomophobia was 20% (95% CI: 19.6%–20.5%). The PET regression further confirmed the small-study effects ($\beta=8.86$, $p=0.002$), while PEESE provided a conservative estimate of 16.3% (95% CI: 9.5%–23.15%). Sensitivity analysis excluding outliers (effect size > 0.5) further lowered the prevalence to 21.1% (95% CI: 17.5%–24.6%), although extreme heterogeneity persisted ($I^2 = 98.07\%$), highlighting the need for cautious interpretation.

For moderate nomophobia, there was strong evidence of publication bias based on the Egger's test ($\beta=5.73$, $p = 0.0016$). However, due to non-convergence of the trim-and-fill method, the PET-PEESE regression was used to evaluate publication bias. PET regression confirmed the small-study effects ($\beta=5.73$, $p=0.003$), while the PEESE adjusted prevalence was 43.7% (95% CI: 36.1%–51.3%). Sensitivity analysis was conducted by excluding outliers (effect size > 0.7) yielding a prevalence of 48.4% (95% CI: 43.4%–53.4%) with $I^2 = 97.92\%$, reflecting unresolved heterogeneity.

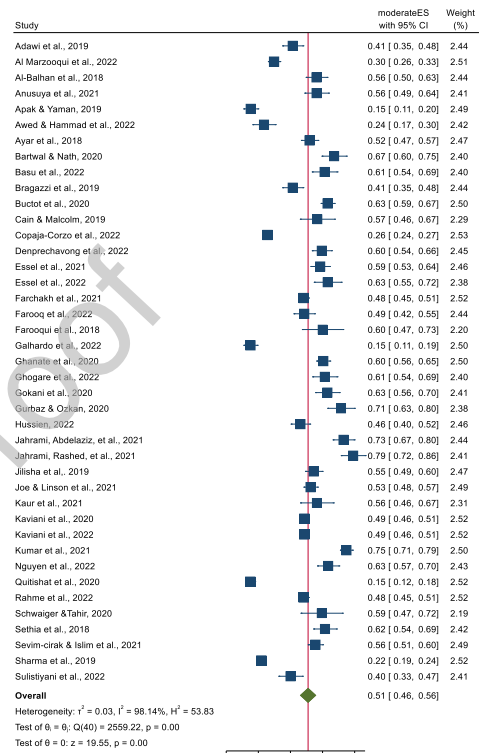
For severe nomophobia, there was strong evidence of publication bias based on the Egger's test ($\beta=9.15$, $p < 0.001$). However, due to non-convergence of the trim-and-fill method, the PET-PEESE regression was used to evaluate publication bias. PET regression further confirmed the small-study effects ($\beta=9.15$, $p < 0.001$). However, PEESE regression explained all heterogeneity ($I^2 = 0\%$), yielding a significant but implausibly small intercept ($\theta = 0.007$,

$p = 0.004$), likely due to overfitting. PET results were prioritized given the residual heterogeneity ($I^2 = 94.55\%$). After excluding outliers (effect size > 0.5), prevalence decreased to 17.9% (95% CI: 15.4%–20.3%) with $I^2 = 97.31\%$, emphasizing methodological and population variability.

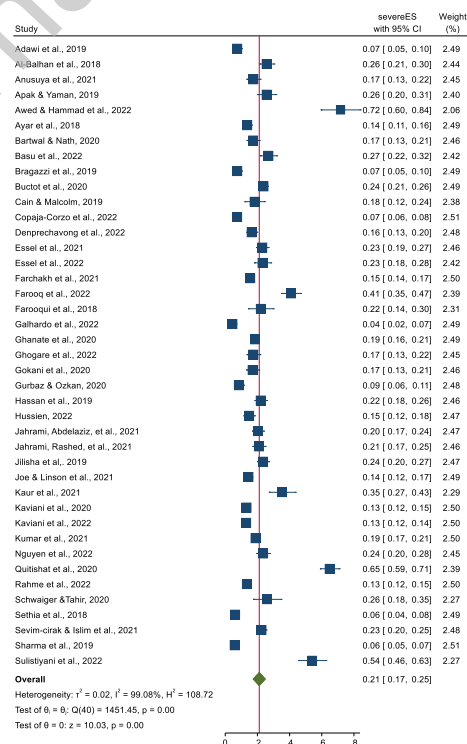
3(a)



3(b)



3(c)



Footnote: ES, Effect Size; CI, Confidence Interval

Figure 3: Pooled prevalence of mild nomophobia (a), moderate nomophobia (b) and severe (c) nomophobia

4 Discussion

The present meta-analytic study comprehensively evaluated the extant literature regarding nomophobia to identify its prevalence and a selected number of potential factors that *a priori* could lead to substantial heterogeneity in the prevalence of this recently emerging problem. It was found that the pooled prevalence of nomophobia was 94%, with almost a quarter of the populations examined displaying severe nomophobia. The findings further suggested that factors such as country of study, economic ranking, study population, instrument used to assess nomophobia, sampling technique, sample size, and study quality contributed to the relatively large heterogeneity. Despite conducting subgroup analyses and meta-regression to account for this variability, residual heterogeneity remained, suggesting the influence of additional unmeasured factors.

The high heterogeneity observed in the meta-analysis highlights significant variations across populations, assessment instruments, and study methodologies. Differences in sampling techniques, cultural perceptions of smartphone dependency, and variations in digital accessibility may have contributed to the inconsistencies across studies. While subgroup analyses helped identify some key sources of variability, a more uniform methodological approach in future research is necessary to improve comparability across studies.

Country-specific prevalence rates further illustrated the complexity of nomophobia as a global phenomenon. The highest pooled prevalence of nomophobia among countries where multiple studies had been conducted was 94% for Turkey, followed by India (93%), and Saudi Arabia (78%). However, the differences prevalence between these countries were not statistically significant, suggesting that nomophobia is a widespread issue affecting multiple regions rather than being confined to specific geographic locations. Similarly, no significant difference was found regarding economic status in terms of nomophobia.

The findings indicated that the pooled prevalence of moderate to severe nomophobia in the present study (72%) was only slightly higher than the previous meta-analysis which reported a pooled prevalence of 70.76% for moderate to severe nomophobia (Humood et al., 2021). Another recent systematic review indicated that the range of nomophobia could be between 6% and 73%, while 13% to 79% could be at risk (León-Mejía et al., 2021). Factors such as the increased dependency and overall usage of smartphone and associated behaviors may underlie the high rates of nomophobia. In addition, the impact of the COVID-19 pandemic on the potentially elevated risk of problematic internet use (Jahan et al., 2021) and social media outages (Jahrami et al., 2022) may have also facilitated the increases in nomophobic behaviors.

The pooled prevalence rate for severe nomophobia was 22%. Previous studies have reported similar findings (Humood et al., 2021). This is concerning because severe nomophobia can affect daily life in many ways such as associations with miscommunication between those affected and health professionals, leading to significantly reduced quality of work (Bülbüloğlu et al., 2020), musculoskeletal problems (Ahmed et al., 2021), sleep dissatisfaction (Jahrami et al., 2022), hyperactivity and oppositional behavioral problems (Kuscu et al., 2021), and psychological stress (Notara et al., 2021). Furthermore, the lockdown and closures during the COVID-19 pandemic of educational institutions imposed on university students to attend online classes is likely to have influenced their smartphone use behavior and further enhanced the risk of nomophobia. The present study's findings indicated that among the different cohorts examined, university students had the highest levels of severe nomophobia (27%), followed by medical students (16%), adults and adolescents (14%), and young adults (13%). Similar findings have been reported elsewhere (Humood et al., 2021). In light of the risk posed by excessive smartphone usage among university students, institution-based preventive strategies targeting this cohort in particular may benefit and potentially result in mitigation of severe nomophobia, thereby attenuating poor health consequences and lowered quality of life associated with it.

Unsurprisingly, younger people were more likely to be affected, likely reflective of the very high penetration of smartphone use and screen use in this age group (Andone et al., 2016). Previous studies have shown that longer hours of smartphone use can increase the possibility of experiencing nomophobia (Gonçalves et al., 2020; Nawaz et al., 2017). The present study

is consistent with such findings, as indicated by the higher levels of nomophobia among young people compared to older counterparts (Notara et al., 2021).

One of the drivers for such increased risk may be the fact that young people are more familiar with modern technologies and tools than other age groups. However, despite the expectation that greater access to technology in HICs would result in higher nomophobia prevalence, the findings suggested otherwise. The pooled prevalence of nomophobia was slightly higher in LMICs and MHICs (95%) than in HICs (92%). Given the minimal difference of 3%, it is important to acknowledge the potential influence of measurement error and study heterogeneity. This small discrepancy may not necessarily indicate a meaningful disparity in nomophobia prevalence across economic regions. Instead, sociocultural and behavioral factors, such as digital dependency, social norms, academic pressures, and access to alternative forms of communication, may play a more significant role in shaping nomophobic behaviors.

Additionally, other factors such as marital status, profession, personality traits, and academic excellence could contribute to the higher nomophobia rates in LMICs (Buctot et al., 2021; Ren et al., 2023). The present study was unable to account for these variables due to data limitations. Moreover, country-specific prevalence estimates varied significantly, ranging from 78% in Saudi Arabia to 94% in both Turkey and India. These differences highlight the possible role of cultural, societal, and economic influences in shaping nomophobia prevalence. Future research should explore these contextual factors to better understand the drivers of nomophobia and develop targeted interventions to mitigate its impact.

Nomophobia has been associated with a variety of psychological and functional impairments, including heightened anxiety, depression, panic disorder, sleep disturbances, low self-esteem, extraversion, poor academic performance, loneliness, obsessiveness, and impaired social relationships (León-Mejía et al., 2021; Notara et al., 2021; Rodríguez-García et al., 2020). In extreme cases, nomophobia can interfere with an individual's ability to concentrate, engage in daily tasks, or maintain healthy interpersonal interactions (Bragazzi & Del Puente, 2014). These outcomes highlight the potential clinical importance of early identification and intervention, particularly among high-risk groups such as students and young adults.

5 Limitations

The present study adds important data concerning nomophobia by including severity categories while also addressing geographic and economic factors assessed using a well validated tool. However, the study also has some limitations that should be noted. First, the heterogeneity of studies was high, likely due to differences in study populations, assessment tools, sampling methods, and cultural variations in smartphone use. While subgroup analyses and meta-regression helped identify some sources of heterogeneity, residual variability remained. This limits the generalizability of the findings. Second, only English-language papers were included, which may lead to language bias and limit the comprehensiveness of the findings. Future meta-analyses should consider incorporating studies published in other languages to ensure a more globally representative dataset. Third, only cross-sectional studies were included because they constituted the majority of available research on nomophobia prevalence. However, cross-sectional designs do not allow for causal inferences or an understanding of how nomophobia evolves over time. Future longitudinal studies are needed to assess the temporal course and potential reversibility of nomophobia, while randomized interventional trials could help evaluate the effectiveness of preventive and therapeutic strategies. Fourth, the Egger's test indicated potential publication bias, suggesting that studies reporting higher prevalence rates may have been more likely to be published. To address this, Duval and Tweedie's trim-and-fill method was employed, which adjusted the pooled prevalence estimate. Although the adjusted results remained consistent with the original findings, publication bias remains a potential limitation. Fifth, it is important to note that while prevalence by severity was analyzed, the classification thresholds varied slightly across instruments. Therefore, differences in interpretation and categorization across tools may introduce some inconsistency, which should be considered when interpreting severity estimates. However, given that almost all studies used the NMP-Q, this is likely to have been of minor concern. Finally, while the present study provides a broad overview of nomophobia prevalence, it does not account for individual-level factors such as personality traits, digital literacy, or social and behavioral influences that may contribute to nomophobia risk. Future research should explore these contextual factors to enhance understanding and develop targeted interventions.

6 Conclusion

The pooled prevalence of nomophobia based on the studies examined was extremely high. University students appeared to be the cohort with the highest levels of severe nomophobia. In contrast, adolescents had the highest prevalence of mild nomophobia, with young adults

presenting the highest prevalence of moderate nomophobia. The markedly high rates of nomophobia found in the present study could serve as a “call to action” for preventive programs to be implemented within different environments (e.g., workplaces, schools, universities) with the specific intent to reduce the overall social and health-related burdens associated with nomophobia.

7 Data sharing statement

The relevant data were provided in the manuscript.

8 Funding

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9 Declaration of interests

The authors have no conflicts of interest to declare in relation to this manuscript.

10 Authors' contribution

FAM conceived and designed the study, wrote the first draft, analyzed and interpreted the results, and made subsequent revision. MAM and MMK assist in literature search, data extraction and subsequent revision. MaM, MSH, MMA, and MoM reviewed and edited the draft. DG and MDG extensively reviewed and edited the draft. MTS supervised the project. All authors approved the final version.

11 References

- Ahmed, S., Akter, R., Pokhrel, N., & Samuel, A. J. (2021). Prevalence of text neck syndrome and SMS thumb among smartphone users in college-going students: a cross-sectional survey study. *Journal of Public Health*, 29(2), 411–416. <https://doi.org/10.1007/s10389-019-01139-4>
- Ahmed, S., Pokhrel, N., Roy, S., & Samuel, A. J. (2019). Impact of nomophobia: a nondrug addiction among students of physiotherapy course using an online cross-sectional survey. *Indian Journal of Psychiatry*, 61(1), 77–80.

https://doi.org/10.4103/psychiatry.IndianJPsychiatry_361_18

- Alwafi, H., Naser, A. Y., Aldhahir, A. M., Fatani, A. I., Alharbi, R. A., Alharbi, K. G., Almutwakkil, B. A., Salawati, E., Ekram, R., Samannodi, M., Almatrafi, M. A., Rammal, W., Assaggaf, H., Qedair, J. T., Al Qurashi, A. A., & Alqurashi, A. (2022). Prevalence and predictors of nomophobia among the general population in two middle eastern countries. *BMC Psychiatry*, 22(1), 520. <https://doi.org/10.1186/s12888-022-04168-8>
- Andone, I., Błaszczewicz, K., Eibes, M., Trendafilov, B., Montag, C., & Markowetz, A. (2016). How age and gender affect smartphone usage. *Proceedings of the 2016 ACM International Joint Conference on Pervasive and Ubiquitous Computing: Adjunct*, 9–12. <https://doi.org/https://doi.org/10.1145/2968219.2971451>
- Bhattacharya, S., Bashar, M. A., Srivastava, A., & Singh, A. (2019). Nomophobia: No mobile phone phobia. *Journal of Family Medicine and Primary Care*, 8(4), 1297–1300. https://doi.org/10.4103/jfmpe.jfmpe_71_19
- Bragazzi, N. L., & Del Puente, G. (2014). A proposal for including nomophobia in the new DSM-V. *Psychology Research and Behavior Management*, 7, 155–160. <https://doi.org/10.2147/PRBM.S41386>
- Buctot, D. B., Kim, N., & Kim, S.-H. (2021). Personal profiles, family environment, patterns of smartphone use, nomophobia, and smartphone addiction across low, average, and high perceived academic performance levels among high school students in the Philippines. *International Journal of Environmental Research Research and Public Health*, 18(10), 5219. <https://doi.org/10.3390/ijerph18105219>
- Bülbüloğlu, S., Özdemir, A., Kapıkıran, G., & Sarıtaş, S. (2020). The effect of nomophobic behavior of nurses working at surgical clinics on time management and psychological well-being. *Journal of Substance Use*, 25(3), 318–323. <https://doi.org/10.1080/14659891.2019.1692926>
- Duval, S., & Tweedie, R. (2000). Trim and fill: A simple funnel-plot-based method of testing and adjusting for publication bias in meta-analysis. *Biometrics*, 56(2), 455–463. <https://doi.org/10.1111/j.0006-341x.2000.00455.x>
- Egger, M., Smith, G. D., Schneider, M., & Minder, C. (1997). Bias in meta-analysis detected by a simple, graphical test. *BMJ*, 315(7109), 629 LP – 634. <https://doi.org/10.1136/bmj.315.7109.629>
- Essel, H. B., Vlachopoulos, D., Tachie-Menson, A., Nunoo, F. K. N., & Johnson, E. E.

- (2022). Nomophobia among preservice teachers: a descriptive correlational study at Ghanaian colleges of education. *Education and Information Technologies*. <https://doi.org/10.1007/s10639-022-11023-6>
- Ghanate, A. N., & MuqtadeerBaig, A. R. (2020). A study on nomophobia, quality of sleep and associated behavioural problems in engineering students. *Indian Journal of Psychiatry*, 62 MA-F, S87–S88.
- Gonçalves, S., Dias, P., & Correia, A.-P. (2020). Nomophobia and lifestyle: Smartphone use and its relationship to psychopathologies. *Computers in Human Behavior Reports*, 2, 100025. <https://doi.org/10.1016/j.chbr.2020.100025>
- Higgins, J. P. T., Thompson, S. G., Deeks, J. J., & Altman, D. G. (2003). Measuring inconsistency in meta-analyses. *Bmj*, 327(7414), 557–560. <https://doi.org/10.1136/bmj.327.7414.557>
- Humood, A., Altooq, N., Altamimi, A., Almoosawi, H., Alzafiri, M., Bragazzi, N. L., Husni, M., & Jahrami, H. (2021). The prevalence of nomophobia by population and by research tool: a systematic review, meta-analysis, and meta-regression. In *Psych* (Vol. 3, Issue 2). <https://doi.org/10.3390/psych3020019>
- Jahan, I., Hosen, I., al Mamun, F., Kaggwa, M. M., Griffiths, M. D., & Mamun, M. A. (2021). How has the COVID-19 pandemic impacted internet use behaviors and facilitated problematic internet use? A Bangladeshi study. *Psychology Research and Behavior Management*, 14, 1127–1138. <https://doi.org/10.2147/PRBM.S323570>
- Jahrami, H. A., Fekih-Romdhane, F., Saif, Z. Q., Alhaj, O. A., AlRasheed, M. M., Pandi-Perumal, S. R., BaHammam, A. S., & Vitiello, M. (2022). Sleep dissatisfaction is a potential marker for nomophobia in adults. *Sleep Medicine*, 98, 152–157. <https://doi.org/10.1016/j.sleep.2022.07.001>
- Jahrami, H., Fekih-Romdhane, F., Saif, Z., Bragazzi, N. L., Pandi-Perumal, S. R., BaHammam, A. S., & Vitiello, M. V. (2022). A social media outage was associated with a surge in nomophobia, and the magnitude of change in nomophobia during the outage was associated with baseline insomnia. *Clocks & Sleep*, 4(4), 508–519. <https://doi.org/10.3390/clockssleep4040040>
- Jahrami, H., Rashed, M., AlRasheed, M. M., Bragazzi, N. L., Saif, Z., Alhaj, O., BaHammam, A. S., & Vitiello, M. V. (2021). Nomophobia is associated with insomnia but not with age, sex, BMI, or mobile phone screen size in young adults. *Nature and Science of Sleep*, 13, 1931–1941. <https://doi.org/10.2147/NSS.S335462>

- Kuscu, T. D., Gumustas, F., Rodopman Arman, A., & Goksu, M. (2021). The relationship between nomophobia and psychiatric symptoms in adolescents. *International Journal of Psychiatry in Clinical Practice*, 25(1), 56–61. <https://doi.org/10.1080/13651501.2020.1819334>
- León-Mejía, A. C., Gutiérrez-Ortega, M., Serrano-Pintado, I., & González-Cabrera, J. (2021). A systematic review on nomophobia prevalence: Surfacing results and standard guidelines for future research. *PloS One*, 16(5), e0250509. <https://doi.org/10.1371/journal.pone.0250509>
- Miller, R. G. (1974). The jackknife-a review. *Biometrika*, 61(1), 1–15.
- Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2010). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Int J Surg*, 8(5), 336–341. <https://doi.org/10.1136/bmj.b2535>
- Munn, Z., Moola, S., Lisy, K., Riitano, D., & Tufanaru, C. (2015). Methodological guidance for systematic reviews of observational epidemiological studies reporting prevalence and cumulative incidence data. *International Journal of Evidence-Based Healthcare*, 13(3), 147–153. <https://doi.org/10.1097/XEB.0000000000000054>
- Nawaz, I., Sultana, I., Amjad, M. J., & Shaheen, A. (2017). Measuring the enormity of nomophobia among youth in Pakistan. *Journal of Technology in Behavioral Science*, 2(3), 149–155. <https://doi.org/https://doi.org/10.1007/s41347-017-0028-0>
- Notara, V., Vagka, E., Gnardellis, C., & Lagiou, A. (2021). The emerging phenomenon of nomophobia in young adults: A systematic review study. *Addiction & Health*, 13(2), 120–136. <https://doi.org/10.22122/ahj.v13i2.309>
- Qutishat, M., Rathinasamy Lazarus, E., Razmy, A. M., & Packianathan, S. (2020). University students' nomophobia prevalence, sociodemographic factors and relationship with academic performance at a university in Oman. *International Journal of Africa Nursing Sciences*, 13, 100206. <https://doi.org/10.1016/j.ijans.2020.100206>
- Ren, S., Liu, T., Zhao, X., Yang, H., & Elhai, J. D. (2023). Is nomophobia problematic or functional? A perspective from bifactor structure. *International Journal of Mental Health and Addiction*, 1–20. <https://doi.org/https://doi.org/10.1007/s11469-023-01030-0>
- Rodríguez-García, A.-M., Moreno-Guerrero, A.-J., & López Belmonte, J. (2020). Nomophobia: An individual's growing fear of being without a smartphone-a systematic literature review. *International Journal of Environmental Research and Public Health*, 17(2), 580. <https://doi.org/10.3390/ijerph17020580>

- Servidio, R. (2021). Fear of missing out and self-esteem as mediators of the relationship between maximization and problematic smartphone use. *Current Psychology*. <https://doi.org/10.1007/s12144-020-01341-8>
- Sethia, S., Melwani, V., Melwani, S., Priya, A., Gupta, M., & Khan, A. (2018). A study to assess the degree of nomophobia among the undergraduate students of a medical college in Bhopal. *Int J Community Med Public Health*, 5(6), 2442–2445.
- Sharma, M., Amandeep, Mathur, D. M., & Jeenger, J. (2019). Nomophobia and its relationship with depression, anxiety, and quality of life in adolescents. *Industrial Psychiatry Journal*, 28(2), 231–236. https://doi.org/10.4103/ipj.ipj_60_18
- Wolfers, L. N., Festl, R., & Utz, S. (2020). Do smartphones and social network sites become more important when experiencing stress? results from longitudinal data. *Computers in Human Behavior*, 109, 106339. <https://doi.org/https://doi.org/10.1016/j.chb.2020.106339>
- World Bank. (2023). *World Bank Country and Lending Groups*. <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups>
- Yildirim, C., & Correia, A.-P. (2015). Exploring the dimensions of nomophobia: Development and validation of a self-reported questionnaire. *Computers in Human Behavior*, 49, 130–137. <https://doi.org/https://doi.org/10.1016/j.chb.2015.02.059>
- Yildirim, C., Sumuer, E., Adnan, M., & Yildirim, S. (2016). A growing fear: Prevalence of nomophobia among Turkish college students. *Information Development*, 32(5), 1322–1331. <https://doi.org/10.1177/0266666915599025>

Table 1: Characteristics of the included studies

Author and publication year	Country	Study design; Sampling technique	Data collection period	Population; Mean age	Sample size; (female %)	Assessment scale	Cutoff and prevalence rate	Quality assessment score
Bartwal & Nath, (2020)	India	Cross-sectional; Census	August 2017- December 2017	Medical students; 20.7±1.72	451; 62.1%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence: Mild-15.5%, Moderate: 67.2%, Severe: 17.3%	7
Farooqui et al., (2018)	India	Cross-sectional; Census	December 2015 to January 2016	Medical students; NR	145; 54.5%	NMP-Q	Cutoff: 0-20: None; 21-60: Mild; 61-100: Moderate; 101-140: Severe Nomophobia Prevalence: Mild: 17.9%; Moderate: 60%; Severe: 22.1%	6
AlMarzooqi et al. (2022)	Saudi Arab	Cross-sectional; Convenience	March and April 2021	Esports vs non-esports players; 24.30±6.04	893; 26.4%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence: Moderate to severe:	7

							29.8%	
Apak & Yaman (2019)	Turkey	Cross-sectional; Purposive	2017/18 academic year	University students; NR	307; 59%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence: Mild: 35.8%; Moderate: 25.7%; Severe: 15.3%	3
Quitishat et al. (2020)	Oman	Cross-sectional; Convenience	February 2018 to March 2019	University students; NR	735; 50%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence: Mild: 20%; Moderate: 15%; Severe: 65%	8
Sharma et al. (2019)	India	Cross-sectional; Purposive	December 2016	Adolescents; 15.5 year	1386; 33%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence: Mild: 41.05%, Moderate: 21.86%, Severe: 5.9%	6
Kaur et al. (2021)	India	Cross-sectional; Convenience	January 2020 to April	University students; 20.84 ±	209; 47.85%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild,	8

		nce	2020	1.51			60-99: Moderate, 100-140: Severe; Prevalen ce: Mild: 8.1%; Moderate: 56.5%; Severe: 35.4%	
Gurbuz & Ozkan (2020)	Turkey	Cross- sectional; Convenie nce	April 2018	Young adults; NR	400; 58%	NSPS	Cutoff: 0-20: None, 21- 44: Mild, 45-74: Moderate, 75-105: Severe; Prevalen ce: Mild: 20%; Moderate: 71.5%; Severe: 8.5%	6
Hassan et al. (2019)	Saudi Arab	Cross- sectional; Simple random	2017/18 academi c year	Universit y students; NR	625; 76.6%	NMP-Q	Cutoff: 0-20: None, 21- 59: Mild, 60-99: Moderate, 100-140: Severe; Prevalen ce: Mild: 63.2%; Severe: 22.1%	5
Jahrami, Rashed, et al. (2021) (Jahrami et al., 2021)	Bahrain	Cross- sectional; Convenie nce	August to Septemb er 2020	Young adults; 27.33 ± 4.83	549; 54%	NMP-Q	Cutoff: 0-20: None, 21- 59: Mild, 60-99: Moderate, 100-140: Severe; Prevalen ce: Mild or moderate:	8

							80%; Severe: 21%	
Jilisha et al. (2019)	India	Cross-sectional; Simple random	NR	College students; NR	774; 58.8%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence: Mild: 20.8%; Moderate: 54.5%; Severe: 23.5%	8
Sethia et al. (2018)	India	Cross-sectional; Purposive	June to September 2016	Medical students; NR	473; 51.6%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence: Mild: 32.1%; Moderate: 61.5%; Severe: 6.1%	7
Schwaiger & Tahir (2020)	Pakistan	Cross-sectional; Convenience	May 2018 to August 2019	University students; 20.43 ± 1.93	138; 66.70%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence: Mild: 11.6%; Moderate: 59.40%; Severe: 26.10%	7

Jahrami, Abdelaziz et al. (2021)	Bahrain	Cross-sectional; Convenience	August 2020	Young adults; 27.2 ± 5.1	654; 54%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence: Mild: 6.6%; Moderate: 73.1%; Severe: 20.3%	8
Kaviani et al. (2022)	Australia	Cross-sectional; Convenience	June 2019 to August 2019	Adults;	2773; 53%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence: Mild: 37.6%; Moderate: 48.6%; Severe: 13%	8
Essel et al. (2021)	Ghana	Cross-sectional; Convenience	April to July 2020	University students; 21.3±1.91	670; 59.3%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence: Mild: 14.9%; Moderate: 58.5%; Severe: 23%	8
Buctot et al. (2020)	Philippines	Cross-sectional; Convenience	December 2018 to April 2019	Adolescents; NR	1447; 59.9%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140:	7

							Severe; Prevalence: Mild: 12.4%; Moderate: 63.2%; Severe: 23.8%	
Cain & Malcolm (2019)	United States of America	Cross-sectional; Convenience	March 2018	University students; NR	192; 64.6%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence: Mild: 24.5%; Moderate: 56.8%; Severe: 18.2%	6
Copaja-Corzo et al. (2022)	Peru	Cross-sectional, Convenience	June 2020 to March 2021	Medical students; NR	3139; 61.1%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence: Mild: 63%; Moderate: 25.7%; Severe: 7.4%	6
Essel et al. (2022)	Ghana	Cross-sectional, Convenience	April 2021	Preservice teachers; 20.8±1.85	345; 56.6%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence: Mild: 13%; Moderate: 63.2%;	6

							Severe: 23.2%	
Adawi et al. (2019)	Italy	Cross-sectional; snowball	NR	Young adults; 27.91±8.63	403; 60.3%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence: Mild: 51.1%; Moderate: 41.4%; Severe: 7.4%	6
Al-Balhan et al. (2018)	Kuwait	Cross-sectional; Convenience	NR	University students; 21.62±4.33	512; NR	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence: Mild: 18%; Moderate: 56.2%; Severe: 25.8%	6
Ghogare et al. (2022)	India	Cross-sectional; purposive	May 8, 2020 to May 17, 2020	University students; 20.33±1.73	412; 73.3%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence: Mild: 18.7%; Moderate: 61.4%; Severe: 17.5%	6
Anusuya et al. (2021)	India	Cross-sectional; simple	July 2019 to August	Medical students;	400; 50%	NMP-Q	Cutoff: 0-20: None, 21-	5

		random	2019	20			59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence: Mild: 25.3%; Moderate: 56.3%; Severe: 17.5%	
Bragazzi et al. (2019)	Italy	Cross-sectional; snowball	NR	Young adults; 27.91±8.63	403; 60.3%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence: Mild: 51.1%; Moderate: 41.4%; Severe: 7.4%	5
Gokani et al. (2020)	India	Cross-sectional; snowball	NR	Medical students and faculty; 22.83 ± 4.68	446; 56.50%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence: Mild: 19%; Moderate: 63%; Severe: 17%	5
Denprechavong et al. (2022)	Thailand	Cross-sectional; convenience	July and October 2020	University students;	638; 77%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence:	6

							ce: Mild: 23.8%; Moderate: 59.6%; Severe: 16.5%	
Kumar et al. (2021)	India	Cross-sectional; snowball	Between the 3 rd week of January and last week of February, 2021	Students; NR	2061; 47.1%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence: Mild: 6.3%; Moderate: 74.8%; Severe: 18.9%	4
Awed & Hammad (2022)	Saudi Arab	Cross-sectional; convenience	September, 2021	Youth; 18.9 ± 1.85	187; 37.43%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence: Mild: 4.81%; Moderate: 23.52%; Severe: 71.65%	6
Farooq et al. (2022)	Pakistan	Cross-sectional; purposive	April 2021	Youth; NR	455; 69%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence: Mild: 10.55%; Moderate: 48.57%; Severe: 40.88%	5

Basu et al. (2022)	India	Cross-sectional; stratified random	December 2020 to January 2021	Medical students; 21.04 ± 1.51	395; 40.8%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence: Mild: 11.9%; Moderate: 61.3%; Severe: 26.8%	5
Ghanate & Muqtadeer Baig (2020)	India	Cross-sectional; Simple random	NR	Engineering students; NR	1400; 45.8%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence: Mild: 19.9%; Moderate: 60.4%; Severe: 18.5%	5
Sulistiyan et al. (2022)	Indonesia	Cross-sectional; simple random	NR	Students; NR	287; 71%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence: Mild: 6%; Moderate: 40%; Severe: 54%	4
Joe & Linson (2021)	India	Cross-sectional; convenience	July to August 2020	Adolescents; NR	1145; 49.26%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe;	5

							Severe; Prevalence: Mild: 32.58%; Moderate: 52.58%; Severe: 14.40%	
Rahme et al. (2022)	Lebanon	Cross-sectional; Simple random	January to July 2019	Adults; 27.98 ± 11.66	2260; 58.8%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence: Mild: 34.1%; Moderate: 48.3%; Severe: 15.50%	7
Sevim-cirak & Islim (2020)	Turkey	Cross-sectional; Convenience	First week of spring semester 2017-2018 academic year	Pre-service teachers; NR	1066; 67.3%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence: Mild: 22%; Moderate: 55.5%; Severe: 22.5%	7
Hussien (2022)	Saudi Arabia	Cross-sectional; convenience	5 th March to 5 th April, 2022	Adults;	526; 60.1%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence: Mild: 39%; Moderate: 46.2%;	7

							Severe: 14.8%	
Nguyen et al. (2022)	Vietnam	Cross-sectional; stratified random	2020-2021 academic year	Adolescents; 16.99 $\pm$ 0.84	556; 59.7%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence: Mild: 12.2%; Moderate: 63.5%; Severe: 23.6%	7
Galhardo et al. (2022)	Portugal (Sample 1)	Cross-sectional; convenience	NR	Adolescents; 13.35 $\pm$ 2.07	338; 58.6%	NMP-Q	Cutoff: Below 15 th percentile : None; between 15 th and 80 th percentile : Mild; between 80 th and 95 th percentile : Moderate; above 95 th percentile : Severe; Prevalence: Mild: 65.7%; Moderate: 15.1%; Severe: 4.4%	7
Ayar et al. (2018)	Turkey	Cross-sectional;	NR	Nursing students; 21.4 $\pm$ 1.3	755; 82.5%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe;	5

							Prevalence: Mild: 31.5%; Moderate: 51.9%; Severe: 13.6%	
Farchakh et al. (2021)	Lebanon	Cross-sectional; Simple random	January to July 2019	Adults; 27.98 ± 11.66	2260; 58.8%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence: Mild: 34.1%; Moderate: 48.3%; Severe: 15.50%	7
Kaviani et al. (2020)	Australia	Cross-sectional; Convenience	June to August 2019	Adults; NR	2838; 52.9%	NMP-Q	Cutoff: 0-20: None, 21-59: Mild, 60-99: Moderate, 100-140: Severe; Prevalence: Mild: 37.3%; Moderate: 48.7%; Severe: 13.20%	7
Dasgupta et al. (2017)	India	Cross-sectional; systematic random	November to December 2015	20.38 [Medical (21.33 ± 2.36), and engineering students (19.44 ± 1.44)]	608 [Medical = 303 (36%); engineering = 305 (82.95%)]	NMP-Q	Cutoff: NR Prevalence: Overall: 43.58% (Medical: 42.6%; Engineering: 44.6%)	6
NMPQ=Nomophobia Questionnaire; NSPS=No Smartphone Scale								

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Table 2: Subgroup analysis of nomophobia

	Random effect meta-analysis results			
Component	Overall (k=43)	Mild (k=40)	Moderate (k=41)	Severe (k=41)
Country				
India	93% (95% CI: 84% to 100%, $I^2 = 95.61\%$)	21% (95% CI: 15% to 26%, $I^2 = 97.58\%$)	58% (95% CI: 51% to 65%, $I^2 = 95.55\%$)	18% (95% CI: 14% to 22%, $I^2 = 96.30\%$)
Saudi Arab	78% (95% CI: 45% to 100%, $I^2 = 98.80\%$)	36% (95% CI: 2% to 69%, $I^2 = 99.31\%$)	33% (95% CI: 20% to 46%, $I^2 = 94.47\%$)	36% (95% CI: 1% to 70%, $I^2 = 99.39\%$)
Turkey	94% (95% CI: 83% to 100%, $I^2 = 85.75\%$)	27% (95% CI: 20% to 34%, $I^2 = 91.68\%$)	48% (95% CI: 25% to 72%, $I^2 = 98.74\%$)	17% (95% CI: 10% to 25%, $I^2 = 95.69\%$)
Test statistics	($\chi^2 = 14.36, p = 0.64$)	($\chi^2 = 2231.88, p < 0.001$)	($\chi^2 = 1335.14, p < 0.001$)	($\chi^2 = 851.36, p < 0.001$)
Economy				
HIC	92% (95% CI: 81% to 100%, $I^2 = 97.43\%$)	36% (95% CI: 23% to 48%, $I^2 = 99.33\%$)	43% (95% CI: 32% to 55%, $I^2 = 98.89\%$)	23% (95% CI: 12% to 35%, $I^2 = 99.61\%$)
LMIC	95% (95% CI: 90% to 100%, $I^2 = 93.16\%$)	19% (95% CI: 15% to 23%, $I^2 = 97.81\%$)	56% (95% CI: 52% to 61%, $I^2 = 94.41\%$)	21% (95% CI: 17% to 26%, $I^2 = 97.89\%$)
MHIC	95% (95% CI: 89% to 100%, $I^2 = 81.47\%$)	33% (95% CI: 20% to 46%, $I^2 = 98.63\%$)	46% (95% CI: 29% to 64%, $I^2 = 99\%$)	15% (95% CI: 10% to 21%, $I^2 = 96.98\%$)
Test statistics	($\chi^2 = 0.30, p = 0.86$)	($\chi^2 = 8.96, p = 0.010$)	($\chi^2 = 5.23, p = 0.07$)	($\chi^2 = 3.13, p = 0.07$)
Population				
Adolescents	90% (95% CI: 78% to 100%, $I^2 = 94.96\%$)	33% (95% CI: 13% to 52%, $I^2 = 99.48\%$)	43% (95% CI: 23% to 63%, $I^2 = 99.25\%$)	14% (95% CI: 6% to 22%, $I^2 = 98.55\%$)
Adults	98% (95% CI: 96% to 100%, $I^2 = 0.05\%$)	36% (95% CI: 34% to 38%, $I^2 = 55.94\%$)	48% (95% CI: 47% to 50%, $I^2 = 0.13\%$)	14% (95% CI: 13% to 15%, $I^2 = 43.84\%$)
Medical students	97% (95% CI: 95% to 100%, $I^2 = 0.01\%$)	28% (95% CI: 13% to 43%, $I^2 = 98.81\%$)	56% (95% CI: 42% to 66%, $I^2 = 96.09\%$)	16% (95% CI: 9% to 22%, $I^2 = 96.82\%$)
University students	95% (95% CI: 90% to 100%, $I^2 = 65.77\%$)	24% (95% CI: 14% to 33%, $I^2 = 98.09\%$)	48% (95% CI: 36% to 61%, $I^2 = 97.61\%$)	27% (95% CI: 19% to 36%, $I^2 = 97.19\%$)
Young adults	100% (95% CI: 96% to 100%, $I^2 = 0.02\%$)	32% (95% CI: 10% to 54%, $I^2 = 98.98\%$)	61% (95% CI: 45% to 77%, $I^2 = 96.36\%$)	13% (95% CI: 7% to 19%, $I^2 = 95.13\%$)
Test statistics	($\chi^2 = 1593.06, p < 0.001$)	($\chi^2 = 935.05, p < 0.001$)	($\chi^2 = 171.83, p < 0.001$)	($\chi^2 = 89.32, p < 0.001$)
Instrument used				
NMPQ	94% (95% CI: 89% to 99%, $I^2 = 95.34\%$)	26% (95% CI: 21% to 31%, $I^2 = 99.10\%$)	50% (95% CI: 45% to 56%, $I^2 = 98.15\%$)	21% (95% CI: 17% to 25%, $I^2 = 99.09\%$)
Test statistics	($\chi^2 = 1.17, p = 0.28$)	($\chi^2 = 2.89, p = 0.09$)	($\chi^2 = 17.85, p < 0.001$)	($\chi^2 = 25.08, p < 0.001$)
Sampling technique				

Census	98% (95% CI: 93% to 100%, $I^2 = 0\%$)	22% (95% CI: 12% to 32%, $I^2 = 92.95\%$)	59% (95% CI: 50% to 69%, $I^2 = 77.73\%$)	17% (95% CI: 12% to 21%, $I^2 = 65.37\%$)
Convenience	95% (95% CI: 88% to 100%, $I^2 = 96.05\%$)	25% (95% CI: 17% to 33%, $I^2 = 99.14\%$)	50% (95% CI: 42% to 58%, $I^2 = 98.63\%$)	23% (95% CI: 16% to 30%, $I^2 = 99.38\%$)
Purposive	88% (95% CI: 75% to 100%, $I^2 = 92.75\%$)	28% (95% CI: 16% to 39%, $I^2 = 97.30\%$)	42% (95% CI: 22% to 61%, $I^2 = 98.70\%$)	19% (95% CI: 6% to 32%, $I^2 = 98.98\%$)
Simple random	96% (95% CI: 93% to 100%, $I^2 = 51.45\%$)	29% (95% CI: 16% to 42%, $I^2 = 99.25\%$)	51% (95% CI: 46% to 57%, $I^2 = 89.98\%$)	23% (95% CI: 13% to 33%, $I^2 = 99\%$)
Snowball	100% (95% CI: 96% to 100%, $I^2 = 0\%$)	32% (95% CI: 9% to 54%, $I^2 = 99.20\%$)	55% (95% CI: 39% to 72%, $I^2 = 96.97\%$)	13% (95% CI: 7% to 19%, $I^2 = 99.25\%$)
Test statistics	($\chi^2 = 358.94, p < 0.001$)	($\chi^2 = 25.71, p < 0.001$)	($\chi^2 = 13.88, p = 0.02$)	($\chi^2 = 17.72, p < 0.001$)
K, number of studies included in the analyses				

Table 3: Univariate meta-regression of nomophobia

	Overall		Mild		Moderate		Severe	
Variables	β (95% CI)	p	β (95% CI)	p	β (95% CI)	p	β (95% CI)	p
Sample size	2.79e-06 (-0.0000561 to 0.0000617)	0.926	.0000659 (6.08e-06 to .0001257)	0.031	-.0000209 (-.0000861 to .0000442)	0.529	-.0000511 (-.0001017 to -5.85e-07)	0.047
Quality assessment score	0.0056958 (-0.032041 to 0.0434326)	0.767	-.0073933 (-.0487177 to .0339311)	0.725	.0159739 (-.0256685 to .0576163)	0.452	-.001288 (-.0351605 to .0325846)	0.941

Declaration of interest

The authors have no conflicts of interest to declare in relation to this manuscript.

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