Association Between Personality Traits/Dimensions and Fear of No Mobile Phone Connectivity (nomophobia): Results of a Lebanese National Study

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ABSTRACT

Objective: To study nomophobia in a large sample of Lebanese adults and its relationship with personality traits and other sociodemographic factors that may contribute to the diagnosis such as sex, parental status, and smoking.

Methods: This cross-sectional study was conducted between January and July 2019. A total of 2,260 residents randomly selected from districts in Lebanon completed a questionnaire about sociodemographic characteristic and smoking. Respondents also completed the Nomophobia Questionnaire, Personality Inventory for *DSM-5*, and NEO Five-Factor Inventory.

Results: The results of a linear regression, taking the nomophobia score as the dependent variable, showed that higher neuroticism (B = 0.648), number of waterpipes smoked per week (B = 0.749), and disinhibition (B = 0.706) were significantly associated with higher nomophobia, whereas more agreeableness (B = −0.535) and detachment (B = −0.594) were significantly associated with lower nomophobia.

Conclusions: This study assessed the variation of inherent personality traits using 2 validated personality questionnaires and their association with nomophobia. As digital use becomes more prevalent within personal and professional aspects of life, nomophobia might become an anxiety risk. Future studies should focus on preventive and treatment measures in the form of awareness campaigns.

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The ever-growing use of digital tools such as personal computers, tablets, and mobile phones are causing changes in individuals' habits and behavior.[1] *Nomophobia*, defined as a fear, discomfort, and anxiety that arises from the nonavailability of these digital devices,[2] has been called a disorder of the modern world and has only been used in recent times. Therefore, its proposal for addition in the updated *DSM-5* is still up for debate,[3] with the *DSM-IV*[4] stating that for an official diagnosis of social phobia disorder to be made, nomophobia must be causing a significant interference in an important area of the individual's life (leisure, social life, work). At present, it is difficult to ascertain what constitutes a full diagnosis rather than traits of the disorder.[3] Symptoms of nomophobia in the literature depict it as a disorder with both anxiety and addictive behaviors such as being anxious about being without mobile phone or internet connection, constantly checking for notifications (known as ringxiety), preferring virtual communication over real-time communication, and incurring debt or great expense from mobile phone use.[3] Due to the vast amount of literature on nomophobia, it can be argued that the disorder remains understudied due to the varying generalized factors associated with it such as personality traits, demographic factors, and substance use,[5] which this study will seek to address.

While research on culture and its impact on nomophobia does exist,[6] as well as theoretical models such as mindfulness,[7,8] research on personality traits and their relationship with nomophobia is lacking. Although the relationship between personality traits and nomophobia has been explored in previous studies,[9,10] important trait domains such as negative affect, detachment, disinhibition, antagonism, and psychoticism have not been investigated.

Nomophobia has been postulated to be within the spectrum of addictive disorders, and previous research has highlighted personality traits and temperaments that are high risk for addictive behaviors.[11] Thus, certain personality traits may place an individual at a higher risk for developing nomophobia. The extent to which nomophobia is associated with personality differences remains unclear.[12] Nomophobia has been found to cause health problems such as tachycardia, respiratory alterations, trembling, and perspiration in people who were apart from their mobile phones compared to healthy controls.[13] One study[12] reported that individuals with higher levels of neuroticism and extraversion were

Clinical Points

- There is a relationship between personality traits and risk of having higher levels of nomophobia, specifically neuroticism and disinhibition, as well as water pipe smoking, which is a very common pastime in Lebanon.
- As digital use becomes more prevalent, especially in the educational sector, young adolescents are at greater risk of developing nomophobia; thus, preventive measures should be developed.

more likely to meet the diagnosis of nomophobia. Another study[14] of personality temperaments reported that reward dependence is significantly related to nomophobia, while cooperation is a characteristic that reduces nomophobia levels.

Several studies[3,15,16] in mostly educational settings such as schools and colleges, often with small sample sizes, reported the average prevalence of nomophobia to be 40% among college students and 53% among the general population. It should be noted that nomophobia is more prevalent in students, as technology is increasingly used among youth both as a form of entertainment and as a means of education.[17]

Over the past decade, there has been a growing fear of nomophobia in the educational sector worldwide, which includes Turkey, India,[18] Bangalore,[15] China,[19] Malaysia,[20] Kuwait,[21] the United States,[11] Spain, Poland, and Finland,[3] highlighting the extent of nomophobia as well as the growing prevalence due to increased use of mobile phones among young adults.

A Lebanese survey assessing nomophobia among 668 undergraduate students showed that approximately 38% reported a form of functional impairment related to smartphone use (poor sleep quality, increased fatigue).[22] A larger survey[23] on internet use disorder conducted in Lebanon found that 75% of youth and adolescents had frequent internet use. Internet use increased in frequency in those with depression, alcohol use, or separated parents, indicating the multifactor variables associated with internet use.[23] These findings confirm that nomophobia is both widespread and prevalent across the globe but also highlights vast differences when comparing sociodemographic factors such as age and sex.

Studies of sex differences among students have found mixed results. Some studies have shown males to have higher levels of nomophobia compared to their female counterparts,[2,24] while others have found that females tend to score higher in nomophobia.[18,25] The mixed results could indicate that nomophobia is distributed evenly between both sexes, and variation is potentially due to cultural differences. While parental status (living together, separated) has been touched upon, the literature on the family dynamic and its relationship to nomophobia has been minimally studied.[26] The present study takes into consideration if parental status, which is a risk factor in developing anxiety and addiction behaviors,[27] might have a significant association with nomophobia.

Nomophobia is also seen as an addiction disorder due to individuals being dependent on the object—be it mobile phones, tablets, or personal computers.[28] The *DSM-5* includes a non–substance abuse category that does not include withdrawal symptoms.[4] Numerous studies have explored the relationship between personality traits and addiction-like behaviors,[11,29] with results showing that poor self-control is highly correlated with alcohol, cannabis, and tobacco use (cigarette and waterpipe use, which are highly prevalent in Lebanon).[30,31] However, the link between addiction and nomophobia has been minimally examined, with 1 study[19] reporting that increased rates of neuroticism lead to an increased severity of addiction-like behaviors, which are prevalent in individuals with nomophobia. Finally, to reiterate, the literature focusing on nomophobia confirms its relationship within the biopsychosocial model, including personality traits, substance use, and demographic characteristics.

The objective of this study was to identify the common factors associated with nomophobia in a large sample of Lebanese adults, specifically taking into account its relationship with personality traits and other sociodemographic factors that may contribute to the diagnosis such as sex, parental status, and smoking (cigarettes and waterpipe).

METHODS

Study Design and Participants

This cross-sectional study was conducted between January and July 2019. A total of 2,260 residents of the community were randomly selected from Lebanon's districts in a proportionate rate. Districts are divided into subdistricts, which are divided into villages. We chose 2 villages per subdistrict from a list provided by the Central Agency of Statistics in Lebanon. The questionnaire was distributed randomly to households based on a random-sampling technique.[32] Those who agreed to take part in the study were invited to complete the questionnaire via a face-to-face interview. All individuals aged > 18 years were eligible to participate. Individuals with cognitive impairment and those who refused to complete the questionnaire were excluded. Data collection was performed by study-independent personnel.

Minimal Sample Size Calculation

Based on the formula $n = \frac{(Z_1 - a/)^2 p(1-p)}{d2}$, wherein n = size of the sample, P = expected proportion, d = the desired margin of error, and $Z_1 - \alpha_{/2} = 1.96$ for $\alpha = 5\%$, a minimal sample of 1,152 participants was needed based on a $P = 50\%$ expected frequency of nomophobia in the absence of similar studies, a $d = 5\%$ risk of error, and a design effect of 3.

Questionnaire

The questionnaire used during the interview was in Arabic, the native language of Lebanon. The first part of the

Table 1. Sociodemographic and Other Characteristics of the Participants (N = 2,260)[a]

Variable	Participants
Sex, n (%)	
Male	926 (41.2)
Female	1,324 (58.8)
Parental status, n (%)	
Living together	1,880 (83.2)
Separated	380 (16.8)
Smoked cigarettes (yes), n (%)	403 (18.1)
Smoked waterpipe (yes), n (%)	470 (21.3)
Age, y	27.98 ± 11.66
House Crowding Index	1.07 ± 0.48
Cigarettes smoked/day	1.27 ± 4.75
No. of waterpipes smoked/week	1.10 ± 2.77
PID-5 domain scores	
Negative affect	4.96 ± 4.14
Detachment	3.79 ± 3.54
Antagonism	3.31 ± 3.21
Disinhibition	3.36 ± 3.46
Psychoticism	4.07 ± 3.64
NEO-FFI domain scores	
Neuroticism	20.19 ± 5.91
Extraversion	23.59 ± 9.46
Openness	22.83 ± 6.43
Agreeableness	28.05 ± 5.48
Conscientiousness	26.00 ± 8.74

[a]Values are presented as mean ± SD unless otherwise specified.
Abbreviations: NEO-FFI = NEO Five-Factor Inventory, PID-5 = Personality Inventory for *DSM-5*.

Table 2. Bivariate Analysis of Factors Associated With Nomophobia[a]

Variable	Nomophobia Score	*P* Value[b]	Effect Size
Sex		**.002**	0.133
Male	69.52 ± 27.20		
Female	73.10 ± 26.65		
Parental status		.093	0.094
Living together	71.99 ± 26.78		
Separated	69.43 ± 27.58		
Smoking cigarettes		.896	0.006
No	71.72 ± 26.63		
Yes	71.91 ± 28.20		
Waterpipe smoking		**.001**	0.174
No	70.93 ± 26.84		
Yes	75.60 ± 26.85		

[a]Values are presented as mean ± SD.
[b]Bolding indicates significant *P* values.

questionnaire assessed the sociodemographic characteristics of the participants (age, number of children, sex, education level, socioeconomic level, and marital status). Smoking was assessed by answering "yes" to the question, "Are you a current smoker?" with the specification that it included smoking at least 1 waterpipe or cigarette in the past 30 days. Questions about the type of tobacco smoked (cigarettes, waterpipe), the number of cigarettes smoked per day, and the number of waterpipes smoked per week were also asked. Participants who did not meet 1 of these 2 criteria were considered nonsmokers. The second part of the questionnaire consisted of the following measures.

Nomophobia Questionnaire

The Nomophobia Questionnaire (NMP-Q) is a 20-item scale[21] that is validated in Lebanon.[33] Items are scored based on a 7-point Likert scale, with 1 = do not agree at all and 7 = strongly agree. Higher scores indicate higher nomophobia. The Cronbach α for this scale was excellent (α = 0.948). The NMP-Q does not have a cutoff point. The total score yielded 4 categories of participants that had no nomophobia (scores of 20), mild nomophobia (scores between 21 and 59), moderate nomophobia (scores between 60 and 99), and severe nomophobia (scores between 100 and 140).

Personality Inventory for *DSM-5*

The adult version of the Personality Inventory for *DSM-5* brief form is validated in Arabic[34] and contains 25 items that assess the 5 personality trait domains: negative affect (involves the experience of negative emotions; items 8, 9, 10, 11, 15), detachment (a state of depression, mistrust; items 4, 13, 14, 16, 18), antagonism (social withdrawal, grandiosity; items 17, 19, 20, 22, 25), disinhibition (being impulsive, irresponsible, careless; items 1, 2, 3, 5, 6), and psychoticism (having odd behaviors and perceptual problems; items 7, 12, 21, 23, 24). This tool is used for adults aged ≥ 18 years. The answers vary from very wrong (scale = 0) to very right (scale = 3).[35] Higher scores indicate greater dysfunction in the specific personality trait domain. The Cronbach α for this scale was excellent (α = 0.943).

NEO Five-Factor Inventory

The NEO Five-Factor Inventory (NEO-FFI) is a 60-item questionnaire that assesses each of the 5 basic personality dimensions (12 questions per domain): neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness.[36] The Arabic version of the NEO-FFI was used.[37] Items are answered on a 5-point Likert scale from strongly disagree to strongly agree. Each facet score was calculated by summing the answers to all the questions of the facet. The Cronbach α for this scale was excellent (α = 0.963) as was that for the different subscales: neuroticism (α = 0.895), extraversion (α = 0.707), openness to experience (α = 0.923), agreeableness (α = 0.920), and conscientiousness (α = 0.931). Higher scores indicate a stronger personality trait.

Data Analysis

SPSS software version 25 was used to perform data analysis. Cronbach α values were recorded to ensure the reliability of the scales. Missing data constituted < 10% of the total database and was therefore not replaced. A normal distribution was found for the NMP-Q score based on the kurtosis and skewness values (varying between −1 and +1).[38] These conditions consolidate the assumptions of normality in samples larger than 300.[39] Student *t* test was used to compare continuous variables in 2 groups, whereas the analysis of variance test was used when comparison involved ≥ 3 groups. Pearson correlation was used for linear correlation between continuous variables. A stepwise linear regression was conducted, taking the nomophobia score as the dependent variable and all variables that showed a $P < .2$ in the bivariate analysis as independent variables. $P < .05$ was considered significant.

Table 3. Multivariable Analysis: Linear Regression Taking the Nomophobia Score as the Dependent Variable[a]

Variable	Unstandardized β	Standardized β	*P* Value[b]	95% CI	
				Lower Bound	Upper Bound
Neuroticism	0.648	0.142	**< .001**	0.434	0.863
Agreeableness	−0.535	−0.106	**< .001**	−0.762	−0.309
No. of waterpipes smoked/week	0.749	0.078	**.001**	0.352	1.145
PID-5 disinhibition	0.706	0.091	**.002**	0.267	1.146
PID-5 detachment	−0.594	−0.078	**.007**	−1.024	−0.163

[a]Nagelkerke $R^2 = 5.2\%$.
[b]Bolding indicates significant *P* values.
Abbreviation: PID-5 = Personality Inventory for *DSM-5*.

RESULTS

Of 2,800 distributed questionnaires, 2,260 (80.71%) were collected. The mean ± SD age of the participants was 27.98 ± 11.66 years (58.8% female). Other characteristics of the personality trait and disorder mean scores are summarized in Table 1. The mean nomophobia score was 71.56 ± 26.92 (median = 71, minimum = 14, maximum = 140). Forty-six (2.0%) had no nomophobia, 769 (34.1%) had mild nomophobia, 1,089 (48.3%) had moderate nomophobia, and 349 (15.5%) had severe nomophobia.

Bivariate Analysis

Significantly higher mean nomophobia scores were seen in females compared to males and in those who smoked waterpipes compared to those who did not (Table 2).

Personality Traits and Disorders and Nomophobia

Higher negative affect ($r = 0.113$, $P < .001$), detachment ($r = 0.087$, $P < .001$), antagonism ($r = 0.093$, $P < .001$), disinhibition ($r = 0.145$, $P < .001$), psychoticism ($r = 0.100$, $P < .001$), neuroticism ($r = 0.179$, $P < .001$), extraversion ($r = 0.045$, $P = .032$), and openness ($r = 0.068$, $P = .001$), as well as a higher number of waterpipes smoked per week ($r = 0.080$, $P < .001$) were significantly but weakly associated with higher nomophobia scores, whereas more agreeableness ($r = -0.154$, $P < .001$) was significantly associated with lower nomophobia scores. Of note, the conscientiousness trait was not associated with nomophobia ($r = 0.007$, $P = .743$).

Multivariable Analysis

The results of a linear regression, taking the nomophobia score as the dependent variable, showed that higher neuroticism (B = 0.648), number of waterpipes smoked per week (B = 0.749), and disinhibition (B = 0.706) were significantly associated with higher nomophobia scores, whereas more agreeableness (B = −0.535) and detachment (B = −0.594) were significantly associated with lower nomophobia scores (Table 3).

DISCUSSION

The main purpose of this study was to explore the relationship between nomophobia and personality traits, while taking into account sociodemographic factors that might play a role in increasing or decreasing nomophobia. The results showed that 98% of the participants had nomophobia (mild, moderate, or severe), which is in line with the worldwide prevalence of nomophobia in developed and developing countries (77%–99%),[26] reiterating that internet use is extremely problematic in Lebanon.[23] However, as mentioned previously, no cutoff point exists for the NMP-Q at the time of this writing. Labels are derived from a purely statistical distribution analysis according to the SPSS visual binning option and not according to the scale's cutoff points and thus should not be interpreted as reflecting clinical severity or functional impact. It is extremely unlikely that 98% should be classified as having nomophobia in the sense of a fully diagnosed disorder but rather as having symptoms of the disorder. We agree that "severe" should be classified as a full diagnosis of nomophobia, while mild and moderate are open to interpretation.

Personality Traits and Nomophobia

Higher levels of neuroticism were associated with more nomophobia. Higher rates of agreeableness were associated with lower rates of nomophobia, which is consistent with the literature.[40] It is important to mention that literature on agreeableness and nomophobia mainly focuses on the predictive risk of nomophobia rather than why individuals who score high in the agreeableness trait tend to be more resilient. It has been suggested that individuals who score high in agreeableness tend to be more socially interactive and therefore have a stronger preference for face-to-face interactions.[41]

Similar to other studies,[9,42] neuroticism is significantly related to nomophobia. Neuroticism is associated with low self-esteem and high approval motivation; therefore, individuals high in neuroticism are drawn to social media sites (eg, Facebook, Instagram) where they hope to gain reassurance behind a screen rather than through face-to-face interaction.[43] From a biological perspective, it has been postulated that individuals who score high in neuroticism are naturally anxious, insecure, and self-pitying and therefore may show heightened levels of panic if their source of security (ie, mobile phones) is compromised.[44]

Maladaptive Personality and Nomophobia

Detachment is classified as social withdrawal and behavioral disturbances.[45] The literature has shown that

nomophobia is a form of escapism,[46,47] and it has been postulated that individuals who score high in detachment levels are more reliant on their digital devices due to being more in control of the level of interaction they wish to have, such as the comfort of being behind a screen without fear of face-to-face social interactions. In our study, however, detachment was associated with lower nomophobia scores. While lower detachment scores are in contradiction with the literature, the reasons are not necessarily at odds. Since detachment is classified as social withdrawal, individuals are likely to be in a position whereby they do not wish to engage in any form of interaction—be it physical or digital.[48] Given the sample size of this study, it can be assumed that higher detachment rates lead to lower nomophobia rates as the sample size increases.

In this study, disinhibition was the strongest personality trait in being diagnosed with nomophobia. While disinhibition is a predictor of nomophobia,[49] research is limited in the general literature. However, several facets of disinhibition such as impulsivity, irresponsibility, and distraction are predictors of nomophobia.[50] It is postulated that digital devices are used in an impulsive manner as a protective shield or transitional object as a means for avoiding social interaction.[50] Moreover, individuals who score high in disinhibition are more likely to engage in addictive behaviors,[51] which in turn could explain why water pipe smoking, a form of recreational substance use, is correlated with disinhibition traits.

Waterpipes and Nomophobia

In our study, results showed that number of waterpipes smoked per week was significantly associated with higher nomophobia. Waterpipe smoking is a preferred pastime within the Lebanese culture,[31] and Lebanon has the highest smoking rates in the Arab region[52] with an estimated 53% of the population aged > 19 years being current smokers[52] and 30% being waterpipe smokers.[53] Waterpipes, also known as hookah, argileh, shisha, goza, hubble-bubble, and narghile, come in different sizes and variations but mainly consist of a pipe, air valve, hose with a mouthpiece, saucer, and a bowl in which the ingredients, mainly tobacco, are burned.[54] The tobacco utilized is known as "hookah tobacco" or "mouassal," which translates from Arabic to "honeyed" and contains around 30% tobacco and 70% honey/sugarcane as well as glycerol and other flavors.[55] It can be smoked by a single individual but usually is passed around within a circle due to its potency and as such is seen as a bonding activity among groups and is regarded more highly than cigarette smoking.

In this study, females who regularly smoked using waterpipes were significantly more likely to meet the diagnosis of nomophobia but showed no significant relationship with cigarette smoking, highlighting differences between types of recreational substance use. The reasons for this difference vary but may be because waterpipe smoking is a dormant activity lasting anywhere from 20 to 90 minutes, giving individuals spare time to use their phones for entertainment.[31] While tobacco remains one of the most addictive substances,[56] only waterpipe smoking contributed to nomophobia, and it remains unclear if other substances play a role in the addictive dynamic of nomophobia.

Clinical Implications

This study highlights personality traits and behaviors as predictors for nomophobia as well as sociodemographic factors. As nomophobia is becoming increasingly prevalent in the educational sector, it is important to recognize associated factors to formulate interactive and preventive measures that target both personality traits that increase (neuroticism and disinhibition) or decrease (agreeableness and detachment) the odds of nomophobia, as well as addictive behaviors (waterpipe smoking). Additionally, the Personality Inventory for *DSM-5* is reliable, short, and fast to administer and highlights important trait domains worth further investigation in individuals with nomophobia.

Limitations

Nomophobia levels were evaluated adopting a questionnaire and not through a clinical interview; for that reason, the responses may possibly include some inaccuracies due to respondents not wanting to reveal vulnerabilities or because of recall and information bias. Furthermore, the NMP-Q is not designed to make the diagnosis of nomophobia—it could only aid in the screening process of the disorder—and further assessment by a psychologist or psychiatrist is necessary to make the definite diagnosis, which as mentioned previously is still being researched. Additionally, the NMP-Q, like all nomophobia questionnaires, does not have a cutoff point and what is considered severe in this study may be seen as moderate in another. However, we feel confident that severe nomophobia as defined in this study leads to impairment, as it strongly affects both the organizational and social life of the individual. Also, selection bias might have been present because of the refusal rate. Information bias is always present in observational studies since participants tend to overestimate or underestimate their symptoms. A residual confounding bias is also possible since there are factors that might have been associated with nomophobia but were not taken into consideration.

CONCLUSION

In conclusion, this study showed the association between some personality traits and nomophobia among a sample of Lebanese adults. As digital use becomes more prevalent within personal and professional life, nomophobia might become a risk factor for anxiety, and susceptible individuals should be aware of its dangers. Future studies should focus on preventive and treatment measures in the form of awareness campaigns. Other possible lines of research could explore the types of activities people perform with their digital devices and their relationship with nomophobia.

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