



## Nomophobia and lifestyle: Smartphone use and its relationship to psychopathologies



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### ABSTRACT

In the last decade, smartphone use increased exponentially among the population mainly among adolescents and young adults. Today, people are constantly clinging to the smartphone in many situations of their life, even though this activity can have physical and psychological negative consequences. Through the popularization of smartphones, a new dependency was born, nomophobia, defined as the fear of being away from one's smartphone. This study analyzes the propensity of young adults (18–24 years old) towards nomophobia and lifestyle. A sample of 495 participants showed a positive and moderate correlation between nomophobia and psychopathological symptoms. Interpersonal sensitivity, obsession-compulsion, and the number of hours of smartphone use per day were identified as strong predictors of nomophobia. Results show that smartphone use, and feelings of personal inadequacy and inferiority are relevant when explaining nomophobia.

### 1. Introduction

In recent years, scientific impetus and the tremendous evolution of technology resulted in smartphones becoming an essential device in people's daily lives. The smartphone provides information in all subjects at any minute and anywhere. Information and communication are now within a distance of a "click", thus making life easier and more practical. Consequently, the smartphone is currently impacting many people's lives, with an increasing number of people who own a smartphone. According to the [Pew Research Center \(2019\)](#), the majority of Americans (81%) and 96% of young adults (18–29) own at least one smartphone.

Given the functionality of smartphones, it is quite common to find people in public places with their smartphones in their hands, interacting with applications ([Hatuka & Toch, 2014](#); [Rahmani & Lavasani, 2011](#); [Rodríguez-García, Moreno-Guerrero, & López Belmonte, 2020](#)), especially young adults because they represent the largest consumer group worldwide ([Head & Ziolkowski, 2012](#)). Smartphone use has become critical in this age group since they use them to play, have access to social networks, news, music and videos, and communicate among themselves ([Jeong, 2016](#)).

Despite the advantages and popularity of smartphones, they can also negatively affect individuals' lifestyles when usage becomes excessive/

dependent, which can have physical, psychological, behavioral, social and affective effects ([Gezgin & Çakir, 2016](#)). Therefore, excessive use of the smartphone can interfere with various aspects of daily life, and this excessive use triggers a series of behaviors that may be inappropriate for the users and the people close to them. However, the issue is not with the use of the device in itself, but with the time people spend on it. The problems emerge when people become dependent on using their smartphone and part of their lives are presently lived virtually ([Gezgin, 2017](#)). Thus, excessive use of the smartphone may lead to nomophobia, which comes from an abbreviation of the expression no-mobile ([King, Valença, & Nardi, 2010](#)). Nomophobia refers to the anxiety, discomfort, and stress caused to the person when they do not have their smartphone readily available to them ([King, 2013](#)). Within the scope of this study, nomophobia is defined as the fear of not being able to use a smartphone and/or the services it offers. It refers to the fear of not being able to communicate and access information, losing the connectedness that smartphones allow, and giving up the convenience that smartphones provide. People have become more and more dependent on their smartphones ([Park, Kim, Shon, & Shim, 2013](#)), which worsens feelings of anxiety caused by being out of smartphone contact.

Nomophobia is considered a disturbance of the digital, virtual and contemporary society, referring to the discomfort, the nervousness, the

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anxiety and the anguish caused by the lack of contact with a smartphone (Jeong, 2016; Lin et al., 2014; Rodríguez-De-Dios, Oosten, & Iguartua, 2018). The symptomatology present in this situation places again the focus on the individuals' lifestyle, which makes it important to evaluate the relationship between nomophobia and lifestyles (Mok et al., 2014).

Despite being an emerging field, existing literature (e.g., Kriswanto, Tri, Meikahani, & Suharjana, 2018; Nath, 2018; Shen, Prior, Wang, & Kuo, 2020) indicates a positive correlation between nomophobia and health problems. Yet, there is limited knowledge about the relationship between nomophobia and individuals' lifestyles. Given this gap in the research, the present study analyzes the propensity of Portuguese young adults (18–24 years old) towards nomophobia and individuals' lifestyles. The study objectives are as follows: (1) to identify sociodemographic variables related to smartphone use; (2) to establish relationships (if any) between nomophobia and psychopathologies; and (3) to determine how nomophobia relates to the lifestyle of young adults.

## 2. Theoretical framework

To explain the nature of the presented study, Blek's theory of the extended self (1988, 2013) offers a set of theoretical assumptions from the field of consumer behavior that are at the core of this study. They are:

- Possessions are central to the sense of self;
- Having, doing, and being are identified as the fundamental states of one's existence and contribute to the definition of who we are;
- The process of self-extension defined as contamination. "In contamination, both good and bad aspects of objects are seen to attach to us through physical contact or proximity" (Blek, 1988, p. 140);

In his studies of extended self, Blek (2013) explores the role of smartphones with consumer behavior and the social nature of digital interaction in today's world. More than extensions of the self, smartphone users co-construe the self through the myriad of daily digital connections. During a time of social distancing, the sense of extended self is exacerbated by billions of people around the world using digital devices to support, learn, teach, work and care for one another. The use of smartphones is at the heart of this collaborative self (Turkle, 2011) that explodes as social engagement and longing for connectedness exacerbates.

The fear of being unable to communicate and remaining connected to everything stems from being technologically incommunicado, away from a smartphone or unable to access the internet (King et al., 2010). It has been argued that the brain already understands that the smartphone is a "member" of the human body (Jeong, 2016). Thus, the brain reacts to the absence of the vibration of the smartphone in the same way that it reacts when one has an amputated limb (Lu, 2008). According to Fisoun et al. (2012), there are cases where people already think and feel that the smartphone vibrated, but in fact, this did not happen. Specifically, this means that the person is already too much involved in the dependence of the smartphone, which causes up to the thought to rotate around the mobile device.

In general terms, nomophobia is a pathological fear of staying away from one's smartphone and without an internet connection. One can say that people who suffer from nomophobia feel an irrational fear of leaving home without a smartphone, and feel great anxiety when they lose it, run out of battery power or have no network coverage. They feel isolated from family and friends because they are not permanently connected with them, and therefore feel the constant need to be aware of what others are doing (Bragazzi & Del Puente, 2014). Thus, people who tend to develop nomophobia are usually those with a dependent, anxious, unsafe profile and predisposition to anxiety disorders. Due to the conditions themselves, people with this profile usually keep their smartphone switched on at all times regardless of location, and when there is no possibility to keep the device connected with sound, they put it in vibrate mode, and they always have it around, available and visible (King, 2013).

However, characteristics such as low self-esteem, inappropriate social behaviors, fear of relating, social anxiety, lack of self-confidence, shyness, low proactivity, social isolation, low coping capacity, low sense of self-efficacy, affective and social relationships seem to be linked to this dependence, which can lead to several impairments in the quality of life due to inappropriate and exaggerated smartphone use (Sales, Silva, & Lima, 2018). In this same line of thought, Kuss and Griffiths (2017, p. 311) argue that "The perceived need to be online may result in compulsive use of SNSs [online social networking sites], which in extreme cases may result in symptoms and consequences traditionally associated with substance-related addictions." The main reason that triggers dependent behavior is individual personality because people use the smartphone as a kind of "shield" to protect themselves and the people around them, and at the same time to forget about the problems they have in their lives.

## 3. From normal smartphone use to pathology

The intense smartphone use in individuals' daily lives due to the mass popularization of these devices made necessary to analyze the limits of its use. Since its use can trigger dependency, it became a serious problem. Even worse is when smartphone extreme usage is not recognized as an issue because it is considered so prevalent especially among young adults in all areas of their lives (Sales et al., 2018). For Deursen, Bolle, Hegner, and Kommers (2015) smartphone dependence occurs because smartphones offer plenty of entertaining experiences that potentially act as rewards, increasing the opportunity for targeted use to become habitual use, triggered by internal stimuli and external. Deursen et al. (2015) mention that when individuals check notifications on the smartphone this can serve as a reward, thus ensuring that the verification reappears and becomes habitual and addictive, which makes it increasingly difficult to control. Thus, this verification of notifications creates a pattern of dependence that can lead individuals to suffer from a possible negative impact on various aspects of their lives. In this context, two concepts are distinguished: the use of the smartphone and its dependence.

Although the use of the smartphone is daily and for several hours, it does not constitute pathological dependence, since it is for appropriate use of the technologies for the benefit (professional or personal) of the individual (King, 2013). Therefore, not all smartphone users are dependent since they are able to abstract from their use and perform other activities without involving smartphones (Kim, 2015). On the other hand, dependence begins to have an impact because smartphones have the peculiarity of when compared to other electronic devices, to be mobile, to the point that they are always within reach of people, no matter where they are. This allows people to use the smartphone abusively, and that dependency becomes more prevalent in today's society (Kwon, Lee, et al., 2013). Smartphone dependency manifests itself in individuals who, when left without the smartphone, end up with emotional and behavioral changes. The symptoms most frequently observed in these situations are anxiety, nervousness, tremors, sweating, among others, that may be related to the impossibility of using the smartphone immediately. These types of symptoms are known as nomophobic symptoms (King, 2013).

When dependence is considered pathological, normal life is compromised by abusive use and its undesirable consequences (King et al., 2014). When compared to dependence on psychoactive substances the dependence to smartphones is also marked by the existence of uncomfortable physical symptoms and significant psychological discomfort, and there may be explosions of strong emotion, feelings of loss, separation, frustration, uneasiness, thing, or even physical expressions of anger and manipulation, coercion or blackmail (Griffiths, 2010).

### 3.1. Dependence of the smartphone and individuals' lifestyles

Because of the excessive increase in smartphone use among young adults, it is important to look at the impact of this dependence on the

individuals' lifestyle and on their quality of life (Kyung, 2016). According to the World Health Organization (1998), a lifestyle is a cluster of closely related behavioral patterns, attitudes, and interests that individuals or groups prefer to follow. They depend on different factors such as economic and social conditions, education, and age, just to mention a few. Therefore, lifestyle corresponds to a set of habits and customs that contribute to the promotion of health. A healthy lifestyle, according to the World Health Organization (1998), is a way of living that lowers the chance of being gravely ill (physically or mentally) or dying early. On the other hand, quality of life is a comprehensive concept, affected by one's physical and psychological health, autonomy, social relationships, and life contexts. Thus, the quality of life is defined by the World Health Organization (1998) as the individuals' perceptions of their position in life in the context of their culture and value systems in which they live and in relation to their goals, expectations, standards, and interests. This concept is associated with essential factors of functioning and well-being such as psychological health, success in school/work, family, or social relationships, and personal fulfillment and healthy lifestyles.

Kwon, Lee, et al. (2013) point out that the growth of smartphone use has negative consequences and that problems can occur at the social and interpersonal levels, educational contexts (learning) and health/well-being. With regard to social and interpersonal issues, individuals may have greater difficulties in (1) social coexistence, that is, in their real life, since they are accustomed to speaking virtually and by "emojis", (2) maintaining a dialogue with another person without holding their smartphone and look directly at the other person while they are talking, or even, they cannot keep a conversation because they do not feel confident enough since they feel more exposed and prefer to interact only virtually (Kwon, Lee, et al., 2013; Mok et al., 2014). This may prove to be detrimental to interpersonal and peer relationships, as these individuals may isolate themselves, making their interpersonal relationships very limited, conflicting, and less rewarding for people in their surroundings (Kwon, Kim, Cho, & Yang, 2013). With regard to consequences in educational contexts (learning), these can vary from the behavior individuals present in the context of the classroom to academic performance. Students use their smartphones in class for different purposes such as sending messages, receiving texts, accessing social networks and even playing games. Even though they engage in these non-class related behaviors they do not realize that such behaviors will have long-term and medium-term negative implications in their academic life. Students fail to pay attention to the subject matter of their classes, may have an attitude of disrespect towards their teachers, and may miss classes and other learning events (Picon, 2015).

Vega, Correa, and Sánchez (2015) corroborate these ideas, stating that because of cell phone addiction, young people have been careless, often neglecting to perform daily and necessary activities, such as reading, studying, sleeping, eating, talking with others, or focus while walking or driving. Smartphone use and dependence impacts negatively one's health and well-being (Kim, 2015). Regarding the physical aspects, these are related to the amount of time that people spend on the smartphone, since they maintain the same posture for a long time, especially with their heads tilted so they can see the screen of the smartphone, thus causing discomfort to the body. Excessive users of smartphones may feel pains in the arms, shoulders, and have cervicogenic headaches that are linked to tensions in the back and neck (Abdelhameed & Abdel-Azien, 2016; Kim, 2015) as well as musculoskeletal injuries in the fingers, hands, wrists and arms (Gold, 2012; King, 2013).

Despite the existing body of research relating individual lifestyle as a protection factor of depressive symptoms (Gómez-Gómez et al., 2020; Ruiz-Estigarribia et al., 2019) and cyberbullying (Rodelli, De Bourdeaudhuij, Dumon, Portzky, & DeSmet, 2018) there is no evidence regarding nomophobia and individuals' lifestyles. Given the growing body of research related to smartphone use and physical and mental health, it seems important to also explore its correlation with lifestyles and understand if more active and healthier lifestyles act as a protective factor of nomophobia. This is what this study proposed to accomplish.

## 4. Methodology

Based on the objectives of the present study, a quantitative methodology was followed. The reasons for this choice relied on the fact that this methodology allows to establish relationships and explain changes among variables, trusts on correlational or quasi-experimental designs in order to reduce bias, uses data to confirm previously constructed hypotheses, and puts the emphasis on the results or products of the research (Günther, 2006; Turato, 2005).

### 4.1. Research design

A descriptive-correlational study was selected to look at the relationships among the variables. Such a study considers several variables in order to explore their mutual relations, thus, to describe the relationships that have been detected among the variables (Fortin, 1999).

### 4.2. Sample

To select the sample of the present study, the non-probabilistic and convenience method was used. The sample comprised of 495 subjects aged between 18- and 24-years old and residents of Braga district, Portugal. In Portugal seven in every 10 citizens have at least one smartphone and more than nine in each 10 have a mobile phone (Marktest Group, 2018).

Because of easier access to participants and study time constraints, the participants were recruited from a regional university and Braga district Scout Group. With the authorization of the institutional boards of the universities and Braga district Scout Group, recruitment was accomplished mainly through electronic communication, word of mouth and long-standing working relationships. Data was collected in a paper and pencil format at the beginning of the classes or meetings and after collecting the participants' informed consent. The goals of the study were presented to the participants and confidentiality of the data was assured to every participant.

The following inclusion criteria were followed to create the sample (1) the participants voluntarily agreed to participate in the study and signed an informed consent, (2) they owned a smartphone, and (3) were older than 18 years old.

Sociodemographic characteristics of the sample are presented in the Results section.

### 4.3. Instrumentation

A sociodemographic questionnaire, the Nomophobia Questionnaire (NMP-Q), the Brief Symptom Inventory (BSI) and the Fantastic Lifestyle questionnaire were administered to the sample. The sociodemographic questionnaire collected data related to age, gender, educational level and smartphone use frequency and patterns.

The Nomophobia Questionnaire (NMP-Q) was developed by Yildirim and Correia (2015) with the purpose to determine levels of nomophobia. This study was the first to devise a self-reported measure to assess the severity of nomophobia among young adults. This instrument offers twenty items organized around four factors/subscales: Factor I, not being able to communicate (6 items); Factor II, losing connectedness (5 items), Factor III, not being able to access information (4 items), and Factor IV, giving up convenience (5 items). The subscales show a high internal consistency: Factor I, not being able to communicate  $\alpha = .939$ ; Factor II, losing connectedness  $\alpha = .874$ ; Factor III, not being able to access information  $\alpha = .827$ ; and Factor IV, giving up convenience  $\alpha = .819$ . Respondents use a seven-point Likert scale, ranging from 1 ("I totally disagree") to 7 ("I totally agree"). The score ranges from 20 to 140 points. Since its creation, the NMP-Q has been translated and validated in several languages with Italian being the first (Bragazzi et al., 2016).

The Brief Symptom Inventory (BSI) was developed by Derogatis and Melisaratos (1983) as a brief psychological self-report symptom scale.

The inventory is a 53-item self-report scale that uses a five-point Likert scale, ranging from 0 (“not at all”) to 4 (“extremely”). It evaluates psychopathologies around nine dimensions and three global indices. This instrument was translated into Portuguese and validated by [Canavarro \(1999\)](#). The inventory maintained its original three global indices of distress (Global Severity Index, Positive Symptom Distress Index, and Positive Symptom Total) and its nine symptom dimensions, as follows:

1. Somatization (7 items), reflects the discomfort resulting from the perception of somatic functioning
2. Obsession-Compulsion (6 items), symptoms identified with the clinical disorder of the same name
3. Interpersonal Sensitivity (4 items), feelings of personal inadequacy, inferiority, particularly in comparison with other people, self-deprecation, hesitation, discomfort, and shyness, during social interactions are the usual manifestations of this dimension
4. Depression (6 items), typical symptoms of clinical manifestations of depression
5. Anxiety (6 items), represents symptoms such as nervousness, tension, somatic generalized anxiety, and panic attacks
6. Hostility (5 items), includes thoughts, emotions, and behaviors indicative of the negative affective state of anger
7. Phobic Anxiety (5 items), focuses on the most disruptive manifestations of phobic behavior
8. Paranoid Ideation (5 items), represents paranoid behavior as a disturbing mode of cognitive functioning
9. Psychoticism (5 items), covers indicators of isolation and schizoid lifestyle and primary symptoms of schizophrenia (e.g., hallucinations)

The global indices measure the current or past level of symptomatology, the intensity of symptoms, and the number of reported symptoms ([Derogatis & Melisaratos, 1983](#)). The Global Severity Index represents a combined score that measures the intensity of malaise experienced with the number of symptoms reported. They are the Positive Symptom Distress Index provides the mean intensity of all symptoms that have been reported, and Positive Symptoms Total represents the number of symptomatic complaints presented.

In psychometric terms, this instrument shows good internal consistency reliability for all nine dimensions, ranging from  $\alpha = .71$  on Psychoticism to  $\alpha = .85$  on Depression. Test-retest reliability for the nine symptom dimensions ranges from 0.68 on Somatization to 0.91 on Phobic Anxiety. For the three global indices, the test-retest reliability ranges from 0.81 (Positive Symptom Distress Index) to 0.90 (Global Severity Index).

The FANTASTIC Lifestyle questionnaire was developed by [Wilson, Nielsen, and Ciliska \(1984\)](#) to assess an individual’s behaviors and to establish an association between lifestyle and health. The acronym FANTASTIC represents the names of the nine domains that the questionnaire covers. They are F = Family and friends, A = Activity (physical activity), N = Nutrition, T = Tobacco & toxics (cigarettes and drugs), A = Alcohol, S = Sleep (sleep, seatbelt, stress and safe sex), T = Type of behavior (e.g., hostile), I = Insight (e.g., positive, optimistic, sad, depressed), and C = Career (work satisfaction with the profession). The items are arranged as Likert scale, 23 of the items have five response options (“Almost never” to “Almost always”) and 2 of the items are dichotomous (“Sometimes” or “Never”).

The FANTASTIC Lifestyle questionnaire was validated and translated to Portuguese by [Silva, Brito, and Amado \(2014\)](#). The newly translated instrument contains one more dimension and five additional items (a total of 30) when compared to the original instrument. An adapted version of the questionnaire was created and named FANTASTICO (“fantastic” in Portuguese). The revised dimensions are: F = Family and friends (2 items), A = Physical activity/associativism (3 items), N = Nutrition (3 items), T = Tobacco (2 items), A = Alcohol and other drugs (6 items), S = Sleep and stress (3 items), T = Work/personality type (3 items), I = Introspection (3 items), C = Health and sexual behaviors (3

items), O = Other behaviors (e.g., safety belt and driving safety) (2 items). This version of the questionnaire yields  $\alpha = .69$  for internal consistency reliability.

#### 4.4. Data collection and analysis procedures

Translations into Portuguese of all instruments were used. Authorizations for data collection were collected from each organization (regional university and Scout Group) and human subjects protection protocols were followed. For example, confidentiality and data de-identification, voluntary participation and informed consent, and security of the data collected. The data from the different questionnaires were entered and analyzed using the Statistical Package for Social Sciences.

## 5. Results

The following section describes the major results of this study. Sociodemographic variables were analyzed, the psychometric properties of Nomophobia Questionnaire (NMP-Q) translated into Portuguese were reported, relationships between nomophobia and smartphone experience were presented, as well as the relationships between nomophobia and lifestyle and psychopathologies.

### 5.1. Sociodemographic variables

The total sample consisted of 495 Portuguese young adults, from 18 to 24 years old (an average of 21 years old) and mostly females ( $n = 259$ , 52.3%) participated in this study. Most of the participants had secondary education ( $n = 358$ , 71.6%). All participants owned a smartphone for an average of 6.4 years ( $SD = 3.28$ ). In regard to the number of hours a day using a smartphone, most participants refer between four to 7 h ( $n = 178$ , 35.8%), especially to social networks ( $n = 234$ , 47.1%). See [Table 1](#) for more details.

### 5.2. Psychometric properties of Nomophobia Questionnaire (NMP-Q)

For this study, the NMP-Q ([Yildirim & Correia, 2015](#)) was translated in Portuguese and its psychometric properties are reported below and referred back to the questionnaire as shown in [Table 2](#).

The item descriptive analysis, with means, standard deviation,

**Table 1**  
Sociodemographic variables.

Variable	Total sample (N = 495)
	M (SD)/% (n)
Age	20.65 (1.99)
Sex	
Female	52.3 (259)
Male	47.7 (236)
Education level	
Secondary education	71.6 (358)
College education	22.0 (110)
Basic education	6.4 (32)
Smartphone (yes)	100.0 (495)
Number of years	6.38 (3.28)
Number hours using smartphone	
Four to 7 h	35.8 (178)
More than 7 h	34.4 (171)
One to 4 h	25.8 (128)
Less than 1 h	4.0 (20)
Most used applications	
Social Networks	47.1 (234)
Games	13.5 (67)
Music	14.1 (70)
News	10.9 (54)
Blogs	10.1 (50)
E-mails	4.4 (22)



**Table 2**  
The 20 items in the NMP-Q.

Factor I – Not being able to communicate
10. I would feel anxious because I could not instantly communicate with my family and/or friends.
11. I would be worried because my family and/or friends could not reach me.
12. I would feel nervous because I would not be able to receive text messages and calls.
13. I would be anxious because I could not keep in touch with my family and/or friends.
14. I would be nervous because I could not know if someone had tried to get a hold of me.
15. I would feel anxious because my constant connection to my family and friends would be broken.
Factor II – Losing Connectedness
16. I would be nervous because I would be disconnected from my online identity.
17. I would be uncomfortable because I could not stay up-to-date with social media and online networks.
18. I would feel awkward because I could not check my notifications for updates from my connections and online networks.
19. I would feel anxious because I could not check my email messages.
20. I would feel weird because I would not know what to do.
Factor III – Not being able to access information
1. I would feel uncomfortable without constant access to information through my smartphone.
2. I would be annoyed if I could not look information up on my smartphone when I wanted to do so.
3. Being unable to get the news (e.g., happenings, weather, etc.) on my smartphone would make me nervous.
4. I would be annoyed if I could not use my smartphone and/or its capabilities when I wanted to do so.
Factor IV – Giving up convenience
5. Running out of battery in my smartphone would scare me.
6. If I were to run out of credits or hit my monthly data limit, I would panic.
8. If I could not use my smartphone, I would be afraid of getting stranded somewhere.
7. If I did not have a data signal or could not connect to Wi-Fi, then I would constantly check to see if I had a signal or could find a Wi-Fi network.
9. If I could not check my smartphone for a while, I would feel a desire to check it.

skewness, and kurtosis, as presented in Table 3 confirms the normality of the distribution in the sample. Given the Kaiser-Meyer-Olkin value of 0.955 and Barlett's test of sphericity ( $\chi^2_{(190)} = 13080,302, p < .001$ ) the requirements for exploratory factor analysis were established. A principal component analysis was performed using varimax rotation, resulting in three factors with eigenvalues higher than 1. For Factor I (not being able to communicate), with an eigenvalue of 13.792, explaining 58.963% of the variance, higher loadings for items 10, 14, 15, 16, 17, 18, 19 and 20 were found. These are questionnaire items that in the original version (see Table 2) were included in Factor II (losing connectedness) and Factor I. For Factor II (losing connectedness), with an eigenvalue of 1.372, explaining 6.859% of the variance, higher loadings for items 1, 2, 4, 7, 9, 11,12 and 13 were found. These items were originally included in and Factor I (not being able to communicate), Factor III (not being able to access information) and Factor IV (giving up convenience). For Factor III (not being able to access information), with an eigenvalue of 1.102, explaining 5.508% of the variance, higher loadings for items 3, 5, 6 and 8, were obtained. These items were originally included in Factor III and Factor IV.

Overall, the 20 items presented high loadings in at least one factor and explained 81.330% of the variance with this tri-factorial solution. In terms of reliability, a total score of 0.976 was found for Cronbach alpha, ranging from 0.914 for the third component, 0.955 for the second and 0.966 for the first component.

In terms of fidelity, the data seem to reinforce the internal consistency of the NMP-Q. Scores above 0.9 attest to this. However, a different structure from the original version may suggest the need for further exploration of the internal structure of this condition (of nomophobia). Being nomophobia a recent construct, it is understandable that there may be some difference between studies, especially when the instrument is translated into a different language and the data collection takes place in a variety of contexts. This indicates the need for further studies to

stabilize the knowledge about the construct.

### 5.3. Relationships between nomophobia and smartphone use

A weak, but positive correlation was found between nomophobia and the number of years participants owned a smartphone ( $r = .169, p < .001$ ). A moderate positive correlation was found between nomophobia and the average number of hours participants use the smartphone per day ( $r = .428, p < .001$ ). However, no correlation was found between nomophobia and the most used applications ( $p > .05$ ). A negative correlation was found between nomophobia and education ( $r = -.144, p = .001$ ). No gender differences or correlation with age were found.

Data suggest the important role of smartphone use experience in nomophobia. Participants who have had their smartphone for more years and have higher mobile phone numbers are at greater risk of nomophobia. And in particular, the moderate correlation with the number of hours they use the mobile phone reinforces the validity of nomophobia as construct.

### 5.4. Nomophobia versus lifestyle and psychosocial variables

At the psychosocial level, lifestyle and psychopathologies were explored. In regard to FANTASTIC lifestyle, only a negative correlation was found between nomophobia and Family and friends ( $r = -.148, p = .001$ ). Concerning symptomatology, a positive correlation was found between nomophobia and Somatization ( $r = .322, p < .001$ ), Obsession-Compulsion ( $r = .394, p < .001$ ), Interpersonal Sensitivity ( $r = .390, p < .001$ ), Depression ( $r = .374, p < .001$ ), Anxiety ( $r = .340, p < .001$ ), Hostility ( $r = .384, p < .001$ ), Phobic Anxiety ( $r = .347, p < .001$ ), Paranoid Ideation ( $r = .381, p < .001$ ) and Psychoticism ( $r = .382, p < .001$ ).

Using linear multiple regression, the impact of personal (gender, age, education), smartphone use, symptomatology and lifestyle in nomophobia was analyzed. As presented in Table 4, a significative model was found ( $F(9, 485) = 31.873, p < .001$ ), explaining 37.2% of nomophobia with the average hours participants spent on their smartphone per day, number of years owning a smartphone, education, Obsession-Compulsion, Work/type personality, Family and friends, Physical activity/associativism and Other behaviors (e.g., safety belt and driving safety).

As coefficients presented in Table 4 show, strong predictors were Obsession-Compulsion ( $\beta = .371, p < .001$ ) and the number of hours of smartphone use per day ( $\beta = .311, p < .001$ ). Education ( $\beta = -.129, p < .001$ ), Family and friends ( $\beta = -.119, p < .001$ ) and Physical activity/associativism ( $\beta = -.102, p = .013$ ) emerged as clear protective factors.

## 6. Discussion

Particularly, in review studies evidence exists regarding the impact of excessive use of the smartphone in sleep disturbance, anxiety and depression (Cárthaigh, Griffin, & Perry, 2020; Han, Kim, & Kim, 2017; Thomée, Härenstam, & Hagberg, 2011; Yang, Fu, Liao, & Li, 2020; Zancan & Tono, 2018). These review studies show a clear correlation of problematic smartphone use with sleep quality, depression and anxiety (Cárthaigh et al., 2020; Yang et al., 2020), and that excessive use of smartphones can cause changes in gene regulation, headache, auditory and visual disturbances, fatigue, memory loss, problems with concentration, fatigue and weakening of brain tissue (Augner & Hacker, 2012; Lemola, 2015; Thomée et al., 2011). Other current studies correlate problematic smartphone use not only with rumination (Elhai, Tiamiyu, & Weeks, 2018), emotion dysregulation (Elhai, Levine, O'Brien, & Armour, 2018; Squires, Hollett, Hesson, & Harris, 2020), but also behavioral problems and attention deficit (Rosen et al., 2014).

In a recent study, Wolfers, Festl, and Utz (2020) examine the use of smartphones and social media sites related to coping stress mechanisms over a period of four years. They found that "more nomophobia, for

**Table 3**  
Item descriptive statistics, and exploratory factor analysis of the Nomophobia Questionnaire.

	M	SD	Skewness	Kurtosis	Component		
					1	2	3
NMPQ_18. I would feel awkward because I could not check my notifications for updates from my connections and online networks. <b>(Losing Connectedness)</b>	4.39	1.940	-.323	-1.111	.820	.409	.234
NMPQ_17. I would be uncomfortable because I could not stay up-to-date with social media and online networks. <b>(Losing Connectedness)</b>	4.49	1.882	-.286	-1.074	.804	.412	.242
NMPQ_16. I would be nervous because I would be disconnected from my online identity. <b>(Losing Connectedness)</b>	4.28	1.933	-.178	-1.084	.789	.267	.415
NMPQ_20. I would feel weird because I would not know what to do. <b>(Losing Connectedness)</b>	4.26	2.025	-.199	-1.171	.785	.293	.384
NMPQ_15. I would feel anxious because my constant connection to my family and friends would be broken. <b>(Not being able to communicate)</b>	4.58	1.855	-.420	-.939	.744	.474	.266
NMPQ_19. I would feel anxious because I could not check my email messages. <b>(Losing Connectedness)</b>	4.31	1.879	-.141	-1.051	.734	.212	.482
NMPQ_14. I would be nervous because I could not know if someone had tried to get a hold of me. <b>(Not being able to communicate)</b>	4.45	1.785	-.266	-.886	.551	.488	.484
NMPQ_10. I would feel anxious because I could not instantly communicate with my family and/or friends. <b>(Not being able to communicate)</b>	4.50	1.784	-.284	-.841	.550	.506	.425
NMPQ_1. I would feel uncomfortable without constant access to information through my smartphone. <b>(Not being able to access information)</b>	4.57	1.929	-.298	-1.066	.204	.853	.261
NMPQ_2. I would be annoyed if I could not look information up on my smartphone when I wanted to do so. <b>(Not being able to access information)</b>	4.68	1.707	-.335	-.879	.175	.841	.333
NMPQ_9. If I could not check my smartphone for a while, I would feel a desire to check it. <b>(Giving up convenience)</b>	4.67	1.847	-.287	-1.094	.391	.766	.199
NMPQ_4. I would be annoyed if I could not use my smartphone and/or its capabilities when I wanted to do so. <b>(Not being able to access information)</b>	4.71	1.776	-.407	-.880	.402	.740	.301
NMPQ_11. I would be worried because my family and/or friends could not reach me. <b>(Not being able to communicate)</b>	4.84	1.677	-.619	-.495	.473	.707	.268
NMPQ_12. I would feel nervous because I would not be able to receive text messages and calls. <b>(Not being able to communicate)</b>	4.56	1.796	-.393	-.881	.506	.651	.311
NMPQ_13. I would be anxious because I could not keep in touch with my family and/or friends. <b>(Not being able to communicate)</b>	4.80	1.719	-.496	-.810	.577	.625	.224
NMPQ_7. If I did not have a data signal or could not connect to Wi-Fi, then I would constantly check to see if I had a signal or could find a Wi-Fi network. <b>(Giving up convenience)</b>	4.58	1.937	-.264	-1.119	.580	.594	.217
NMPQ_3. Being unable to get the news (e.g., happenings, weather, etc.) on my smartphone would make me nervous. <b>(Not being able to access information)</b>	4.08	1.853	.065	-1.123	.140	.425	.818
NMPQ_5. Running out of battery in my smartphone would scare me. <b>(Giving up convenience)</b>	4.07	1.933	.061	-1.237	.313	.335	.790
NMPQ_6. If I were to run out of credits or hit my monthly data limit, I would panic. <b>(Giving up convenience)</b>	3.88	2.003	.134	-1.218	.456	.213	.773
NMPQ_8. If I could not use my smartphone, I would be afraid of getting stranded somewhere. <b>(Giving up convenience)</b>	4.18	1.988	-.063	-1.214	.451	.204	.681

**Table 4**  
Linear multiple regression analysis investigating the impact of smartphone use, symptomatology and lifestyle variables.

	B	Standard Deviation	Beta	t	p
(Constant)	21.014	7.609		2.762	.006
Average hours spent on smartphone per day	10.976	1.346	.311	8.157	.000
Obsession-compulsion	1.734	.179	.371	9.675	.000
Number of years with smartphones	1.451	.367	.154	3.948	.000
Work type personality	3.733	.899	.182	4.155	.000
Education	-3.444	.970	-.129	-3.550	.000
Family and friends	-3.094	1.105	-.119	-2.801	.005
Other behaviors	3.033	1.122	.112	2.705	.007
Physical activity and association	-1.809	.722	-.102	-2.505	.013

Note: R = .61, R<sup>2</sup> = .372, R<sup>2</sup><sub>adj</sub> = .360.

example, was associated with a higher stress level at the same time point, while passive Facebook use was associated with more stress six months later for younger adults” (Wolfers et al., 2020, para. 77).

The results of the current study largely match the results obtained by Lee, Kim, Mendoza, and McDonough (2018). These authors investigated the relationship between the Nomophobia Questionnaire (NMP-Q) and the Obsessiveness Content Scale (OBS) among 397 undergraduate students. Results indicate that the OBS latent variable correlated with all of the four NMP-Q latent variables, which supports the rise of “personality disorders (e.g., obsessiveness) that are emerging from the overuse of mobile phones or the excessive fear of losing one’s cell phone.” (para. 1).

These seem to be interesting points of contact between these two studies in regard to validity and obsession as a determinant factor.

Another study conducted in Spain and Portugal (Gutiérrez-Puertas et al., 2019) using the NMP-Q among nursing students found that “Portuguese students (54.7%) felt more anxious than the Spanish students (35.4%) if their battery ran out. Similarly, the Portuguese population showed a greater need for instant communication with their family and friends.” (p. 79). However, no correlation was found with individuals’ lifestyles. Considering the literature about lifestyle and health (e.g., Gómez-Gómez et al., 2020; Loef & Walach, 2012; Rodelli et al., 2018; Ruiz-Estigarribia et al., 2019) this might be an indication of the transversal use of smartphone and the differences are probably not related to this kind of individual styles, but more with psychosocial processes.

Most of these authors would agree (e.g., Rodríguez-García et al., 2020) that the research in nomophobia is predominantly exploratory, mostly descriptive and cross-sectional studies with adolescents and college students. The Nomophobia Questionnaire (NMP-Q) by Yildirim and Correia (2015) appears to be the most widely used measurement.

As Blek (1988, 2013) and Turkle (2011) make evident the extensions of self, co-construction and collaborative self provide a scaffold to better understand nomophobia as a phenomenon at the intersection of today’s mundane life. At a time that great attention has been placed on behavioral dependencies and digital connectedness, future studies should be conducted to better explore relationships between nomophobia and behavioral disorders. In particular, the role of obsession-compulsion deserves to be highlighted and better explored in the future.

As far as practical implications, the predictive power of obsession-compulsion and the number of hours of smartphone use per day reveal the role that smartphone use can play in dealing with stress as an impulsive/compulsive behavior to relieve anxiety. In a highly

competitive context and with great challenges facing these young people, the smartphone offers a resource for stress relief.

## 7. Conclusions

Nomophobia, or no mobile phone fear, is a reality in today's society where smartphone use has a significant role in people's health/wellbeing and their adjustment to the world they live in. The fear of being away from one's smartphone has received public attention and recent research has shown its relationship with lifestyle and psychopathologies. In the current study, data suggest that nomophobia is independent of gender or age. Surprisingly, data also suggest that nomophobia is independent of lifestyle. It, therefore, appears to be a more widespread phenomenon among Portuguese young adults. However, education and relationships with family and friends appeared as protective factors. Individuals with higher levels of education and better relationships with family and friends tend to have less nomophobic symptoms.

In sum, a positive and moderate correlation was found between nomophobia and psychopathological symptoms with interpersonal sensitivity being a strong predictor of nomophobia along with obsession-compulsion, and the number of hours of smartphone use per day. Results show that smartphone use and feelings of personal inadequacy and inferiority are relevant when explaining nomophobia. Interpersonal sensitivity, obsession-compulsion, and the number of hours of smartphone use per day were identified as strong predictors of nomophobia. Results show that smartphone use and feelings of personal inadequacy and inferiority are relevant when explaining nomophobia.

In regard to the limitations of this study, the non-probabilistic and convenience method used to select the sample of this study may be considered a limitation. At the same time, the high social desirability of nomophobia as a topic that has been widely explored should suggest some caution in generalizing the results.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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