ORIGINAL ARTICLES

Nomophobia and the pandemic: a study on the fear of being disconnected in Brazil

Nomofobia e pandemia: um estudo sobre o medo de ficar desconectado no Brasil

Nomofobia y pandemia: un estudio sobre el miedo a la desconexión en Brasil

Dayana Boechat[1,a]
dayboechatm@gmail.com | https://orcid.org/0000-0003-0651-1429

André Pereira Neto[2,b]
andrepereiraneto@gmail.com | https://orcid.org/0000-0003-3631-8857

Leticia Barbosa[2,c]
leticiatbs@gmail.com | https://orcid.org/0000-0002-7341-260X

[1] Oswaldo Cruz Foundation, Institute of Scientific and Technological Communication and Information in Health. Rio de Janeiro, RJ, Brazil.
[2] Oswaldo Cruz Foundation, Sergio Arouca National School of Public Health. Rio de Janeiro, RJ, Brazil.

[a] Master's Degree in Information and Communication in Health from the Oswaldo Cruz Foundation.
[b] PhD Degree in Public Health from the State University of Rio de Janeiro.
[c] PhD Degree in Information and Communication in Health from the Oswaldo Cruz Foundation.

ABSTRACT

The Information and Communication Technologies are present in human life. They offer many advantages, however, they can also cause problems, among them nomophobia – anguish and fear of becoming incommunicado without access to a smartphone or the internet. The Nomophobia Questionnaire (NMP-Q) was created to assess the degree of nomophobia. The objective of this study was to evaluate to what extent the social isolation proposed as a preventive measure against covid-19 spread interfered with the indices of nomophobia in Brazil. An adapted version of the NMP-Q was applied online to participants in a wide range of ages through digital media during the pandemic. The results indicate that social isolation interfered with the increase of nomophobia, especially in women aged 20 to 29 and 50 to 59 years, with an undergraduate or graduate degree and earning 10 to 20 minimum wages. This study is part of a set of international studies that used the NMP-Q to assess the fear of being disconnected.

Keywords: Nomophobia; Smartphone; Internet access; Pandemic; Covid-19.

RESUMO

As Tecnologias da Informação e Comunicação estão presentes na vida humana. Oferecem diversas vantagens, mas podem provocar problemas, entre eles a nomofobia – a angústia e o medo de se tornar incomunicável, sem acesso ao *smartphone* ou à internet. Para avaliar o grau de nomofobia foi criado o Nomophobia Questionnaire (NMP-Q). O objetivo deste artigo foi avaliar em que medida o isolamento social, como medida preventiva à covid-19, interferiu nos índices de nomofobia no Brasil. Foi aplicada uma versão adaptada do instrumento NMP-Q, durante a pandemia, a jovens através das mídias digitais. Os resultados indicam que o isolamento social interferiu no aumento da nomofobia, sobretudo em mulheres de 20 a 29 anos e de 50 a 59 anos, universitárias ou com pós-graduação e ganhando de 10 a 20 salários-mínimos. Este artigo se inscreve no conjunto de estudos internacionais que usaram o NMP-Q para avaliar o medo de ficar desconectado.

Palavras-chave: Nomofobia; *Smartphone*; Acesso à internet; Pandemia; Covid-19.

RESUMEN

Las Tecnologías de la Información y la Comunicación están cada vez más presentes en la vida humana. Ofrecen numerosas ventajas; pero también pueden causar problemas, entre ellos la nomofobia – la angustia y el miedo a quedar incomunicado, sin acceso a *smartphone* o internet. Para evaluar el grado de nomofobia, se creó el Nomophobia Questionnaire (NMP-Q). El objetivo fue evaluar hasta qué punto el aislamiento social interfiere en los índices de nomofobia en Brasil. Durante la pandemia se aplicó una versión adaptada del NMP-Q a jóvenes a través de los medios digitales. Los resultados indican que el aislamiento social interfirió en el aumento de la nomofobia, especialmente en mujeres de 20 a 29 años y 50 a 59 años, con título universitario o postgrado y 10 a 20 salarios mínimos. Este artículo forma parte de un conjunto de estudios internacionales que evaluaron el miedo a la desconexión mediante el NMP-Q.

Palabras clave: Adicción al teléfono celular; *Smartphone*; Acceso a internet; Pandemia; Covid-19.

INTRODUCTION

Information and Communication Technologies (ICT) are present in different dimensions of human life, producing different effects and transformations in different fields of society. The use of mobile devices has become essential in everyday life, gaining more and more relevance in private and professional life (Pereira Neto; Barbosa; Flynn, 2021).

Leite *et al.* (2020) indicate that the abusive use of digital media through cell phones can have effects on mental health. Lourenço *et al.* (2015, p. 53) admit that "the excessive use of technology and media can lead to eating problems, aggression, sexual behavior, use of illicit substances, and academic difficulties". Furthermore, many people are afraid of becoming incommunicable when separated from their *smartphones* or without an internet connection (Eisenstein; Silva, 2021).

This social phenomenon has been called "nomophobia" (Boechat, 2021). This expression comes from English and means the combination of "No mobile" with the word phobia, that is, nomophobia is the fear of being left without communication through a mobile device. According to King and Nardi (2014), the term "nomophobia" was used specifically to designate "the discomfort or anguish caused by the fear of being incommunicado or by the impossibility of communicating via cell phone, computer, or internet (going *offline*) (King; Nardi, 2014, p.4).

For King and Nardi (2014), the phenomenon of nomophobia is configured in the context of the dissemination of ICT and its presence in most everyday activities. According to the authors: "[...] since this social phobia was coined in the first decade of the 21st century, an increasing number of studies have researched and reported the prevalence of this technology-related problem" (León-Mejía *et al.*, 2021, p.1).

According to Kuss and Griffiths (2017), nomophobia can be seen as a specifically psychological addiction. It has a series of characteristics similar to other types of addiction such as loss of self-control, withdrawal, psychological dependence, interference with daily life, and loss of interest in other activities. It's not difficult to find a group of people in which almost everyone uses their *smartphones* for hours and hours in a day. Many individuals have become accustomed to always being connected and, therefore, feel the need to maintain access to their devices at all times. They do not consider this to be a problem because it is normal for them to be connected during most of the day and night (Borges; Teixeira, 2026).

One point that has mobilized different researchers is how to diagnose this psychological addiction. According to Maziero and Oliveira (2017), it is difficult to diagnose this dependence as legitimate, personal, or professional use sometimes masks a dysfunctional behavior. According to Coelho and Oliveira (2014), dependence itself is related to the brain's reward mechanism that seeks to reinforce such behavior. Therefore, dependent behavior triggers this reward mechanism and is repeated in search of gratification. This behavior is seen as pathological – when the subject repeats it even though it is harmful in their social, family, or professional environments (Coelho; Oliveira, 2014).

One of the ways to carry out the diagnosis proposed by Yildirim and Correia (2015) is to identify the existence or not of the behavior considered nomophobic. This is the Nomophobia Questionnaire (NMP-Q), an instrument that was created from focus groups and semi-structured interviews carried out with American university students; it consists of twenty items distributed in four dimensions, which must be answered by a person who has symptoms of the disorder. The items are composed of statements that must be answered on a Likert scale ranging from 1 (Strongly disagree) to 7 (Strongly agree).

The present study seeks to associate the diagnosis of nomophobia using the NMP-Q during the covid-19 pandemic, which began in 2020 (Croda; Garcia, 2020). This context is unique in that social isolation was one of the preventive measures for the spread of the virus.

Let's look at this aspect in more detail. One of the most widespread safety measures taken by authorities during the pandemic was the practice of social distancing and isolation. The majority of decision-makers chose to encourage this action despite not having the support of a significant part of the Federal Government. Thus, many state and municipal governments adopted strategies to control population mobility such as closing schools and universities, non-essential commerce, and public leisure areas (Croda; Garcia, 2020).

Social isolation has impacted different areas, including mental health. For Garrido and Rodrigues (2020), social isolation kept people away from social life, worsening social health conditions. According to Nabuco, Oliveira, and Afonso (2020), the pandemic promoted the emergence of mental disorders in people who did not have them before.

In this context, this study is structured around the following question: has social isolation interfered with the prevalence of nomophobic behaviors?

The present study has two main objectives. Initially, we will present the translation of the NMP-Q tool, including aspects that help us establish a relationship between nomophobia rates and social isolation promoted as a preventive measure against the spread of covid-19. With this new tool in hand, we will assess the extent to which the social isolation imposed by the covid-19 pandemic has interfered with the increase in nomophobia. To investigate such questions, a unique version of this tool was built and its questionnaire was answered by young people through digital media.

METHODOLOGY

The original version of the NMP-Q questionnaire was created by Yildirim and Correia (2015). It consists of twenty items in the form of affirmations. According to the authors, the answers to each statement would reveal a greater or lesser tendency towards nomophobia. According to Yildirim and Correia (2015), the items were presented as affirmative sentences so that participants could indicate the degree of agreement or disagreement with each of them using a 7-point Likert scale.

The degree of agreement indicated in the questionnaire responses would correspond to a certain score on the scale. The sum of points obtained in each item can vary between 20 and 140. From this perspective, Yildirim and Correia (2015) sought to establish a relationship between the questionnaire's score ranges and the levels of nomophobia. Following this logic, the highest values would be associated with the most serious situations of the condition. The authors propose that the NMP-Q results be interpreted as follows (Table 1):

Table 1 – Relationship between the total score in the NMP-Q questionnaire and level of nomophobia

Points	Interpretation
Up to 20 points	Absence of nomophobia
From 21 to 59 points	Mild level of nomophobia
From 60 to 99 points	Moderate level of nomophobia
From 100 to 140 points	Severe nomophobia

Source: adapted from Yildirim and Correia (2015).

This questionnaire was used in studies conducted in different countries with different sociocultural realities. González-Cabrera *et al.* (2017) applied it in Spain; Gao *et al.* (2020) in China; Adawi *et al.* (2018) in Italy; Lin *et al.* (2018) in Iran; Al-Balhan *et al.* (2018) in Kuwait; Nawaz *et al.* (2017) in Pakistan; Yildirim *et al.* (2016) in Türkiye; and Silva *et al.* (2020) and Rocha *et al.* (2020) in Brazil.

In some studies, questions were added to the questionnaire to identify the profile of participants. With them, it is possible to investigate, for example, the prevalence of nomophobia among women, men, young adults, or adults.

Here we introduce questions aimed at improving the tool and making it more suitable for the central question of this study, which seeks to evaluate any correlation between nomophobia and social isolation – used as a measure to prevent the spread of covid-19. We aimed to identify the relationships between social isolation and nomophobic behaviors during the covid-19 pandemic.

Following the structure used by the aforementioned authors, we added questions to the instrument to map the participants' profiles grouped into three dimensions: socioeconomic, internet use, and research context. We included age group, education, gender, and family income in the socioeconomic dimension.

The classification of age brackets followed the guidelines of the Brazilian Institute of Geography and Statistics (IBGE), namely: 18/19 years old; 20 to 24 years old; 25 to 29 years old; 30 to 39 years old; 40 to 49 years old; and 50 to 59 years old (IBGE, 2010). Therefore, we intended to discuss the relationship between nomophobia not only among young people but also among older individuals. Concerning education, we resorted, once again, to the IBGE (2010) classification, namely: I never studied; Incomplete elementary and middle school education; Complete elementary and middle school education; Incomplete high school; Complete high school; Incomplete higher education; Complete higher education; and Graduate studies. We intended to establish a relationship between education levels and the greater or lesser levels of nomophobic behaviors.

The gender variable was also included, aiming not only to identify the greater or lesser predominance of a given gender but also to participate in the international debate in this regard. This is because Al-Balhan *et al.* (2018), González-Cabrera *et al.* (2017), Yildirim *et al.* (2016), Gao *et al.* (2020), and Adawi *et al.* (2018) identified the prevalence of nomophobia among women. We did not consider it necessary to include the variable 'marital status' used by Silva *et al.* (2020) and Gao *et al.* (2020).

Our study included one variable related to the socioeconomic profile that was absent in articles that used the NMP-Q questionnaire: family income. With this, we intended to elucidate whether there is a significant difference in nomophobia scores between participants according to their social condition. The classification was made according to the socioeconomic division applied in the IBGE population census (2010), namely: up to 2 minimum wages; from 2 to 4 minimum wages; from 4 to 10 minimum wages; from 10 to 20 minimum wages, and above 20 minimum wages.

The dimension of internet use was constructed by four variables that follow distinct and complementary objectives. One of them is the variable 'time spent on the smartphone'. This indicator can act as a possible predictor for nomophobia disorder. Therefore, we intended to verify whether more or less time spent using a smartphone would be correlated with a greater or lesser degree of nomophobia. In this case, we built a classification that divided the 'time spent on the smartphone' as follows: 2 to 4 hours per day; 4 to 8 hours a day; 8 to 16 hours a day; and 16 to 24 hours a day.

The second variable used in this dimension was associated with the type of device used to access the internet (smartphone, notebook, desktop, or tablet). With this, we intended to confirm the hypothesis of the prevalence of smartphone use.

The third variable used in this dimension was associated with the resource used to make the connection. Therefore, we built indicators to check whether access was possible thanks to the home Wi-Fi network, the neighbor/work Wi-Fi network, the open Wi-Fi network, or the mobile data plan.

In our view, the context in which the research that served as the basis for this article was carried out gives this work a unique character. The third dimension sought to establish a relationship between nomophobia and social isolation recommended by international health authorities as one of the measures to prevent

infection by the covid-19 virus. The inclusion of this dimension is closely related to the potential impacts caused by pandemics on people's mental health and well-being. Furthermore, social isolation caused many in-person activities to migrate to the virtual environment.

The fourth variable present in the dimension of internet use asked whether the person had the habit of turning off their smartphone at bedtime. In our opinion, there could be a relationship between the habit of keeping the cell phone on while the user sleeps and higher nomophobia scores. The user who keeps the phone on, even while sleeping, allows their sleep to be disturbed or interrupted due to receiving messages or notifications, for example.

The data revealed by the survey on the use of ICT in Brazilian households (ICT Domicílios) in 2020 indicates that during the covid-19 pandemic, there was an increase in the number of people using digital technologies in Brazil. In 2019, this percentage reached 71% of households; in 2020 it reached 83% (Núcleo de Informação e Coordenação do Ponto BR, 2021).

The questionnaire, which served as the basis for the research that became this article, was made available through the Google Forms platform. The disclosure occurred through posts on Facebook and Instagram and a link shared via WhatsApp. Thus, interested parties were able to answer questions and invite other participants. Therefore, the procedure for attracting participants was similar to that adopted in studies carried out in Italy (Adawi *et al.*, 2018), Brazil (Silva *et al.*, 2020), and Pakistan (Nawaz *et al.*, 2017).

We adopted this procedure due to the limitations on physical circulation imposed by pandemic prevention measures. The questionnaire was made available on December 4, 2020, and remained open until April 5, 2021. A total of 222 valid responses were received. It is worth making some notes about the characteristics of the sampling.

In our research, non-probability sampling using the snowball technique was conducted. According to Vinuto (2014), this type of sample receives this name because the person interviewed has the possibility of nominating or inviting another participant. Thus, the sampling process develops like a snowball. This type of sampling is mainly used for exploratory purposes to obtain a better understanding of a topic. This technique is appropriate for research with groups that are difficult to access or on more private topics (Bockorni; Gomes, 2021).

Thus, the results of the present "exploratory study" can hardly be generalized, however, they may indicate possible trends. In a seminal work, Theodorson (1970) defined that this type of study aims to make the researcher familiar with a social phenomenon. It helps the investigator define his research problem and formulate his hypothesis more precisely. It also allows the researcher to choose the most appropriate techniques for their research and decide on the issues that most need to be emphasized. The "exploratory study" can also reveal potential difficulties in developing the research that is intended to be carried out.

RESULTS AND DISCUSSION

The results of the survey with 222 participants using the NMP-Q questionnaire score and levels of nomophobia, as proposed by Yildirim and Correia (2015), are presented in Table 2.

Table 2 – Research results according to the NMP-Q questionnaire score and the level of nomophobia

Points	Interpretation	Number of participants
Up to 20 points	Absence of nomophobia	0
From 21 to 59 points	Mild level of nomophobia	43
From 60 to 99 points	Moderate level of nomophobia	112
From 100 to 140 points	Severe nomophobia	67

Source: elaborated by the authors.

Regarding the results, our attention was drawn to the fact that no research participant demonstrated an "absence of nomophobia". According to the scale proposed by Yildirim and Correia (2015), all respondents showed some mild, moderate, or severe nomophobic behavior. In the present study, we focused attention on participants who had higher scores and who were classified as with moderate and severe levels of nomophobia.

Let's first look at the results obtained according to the age groups. Initially highlighting the residual participation of young people constitutes an important limitation of our study – only four out of 222 participants were 18 or 19 years old. They exhibited moderate or severe nomophobic behaviors. Therefore, it is not possible to state that this population was more prevalent or vulnerable to nomophobia during the pandemic.

In our research, the age groups 20 to 24, 25 to 29, and 50 to 59 years old showed high rates of nomophobic behavior, with, respectively, 9.4%, 10.8%, and 36% participants with moderate and severe nomophobia.

This result contrasts with that obtained in other studies that applied a similar questionnaire to identify the age group of participants and state that the younger population is the most vulnerable to this disorder (Adawi *et al.*, 2018; González-Cabrera *et al.*, 2017; Nawaz *et al.*, 2017; and Yildirim *et al.*, 2016). Our results showed that nomophobia can affect both young people and the elderly population.

In terms of education, the results indicate that those most susceptible to nomophobic behaviors are those who have incomplete higher education and incomplete graduate degrees. As mentioned previously, the results indicate that nomophobic behaviors were more prevalent among young people aged 20 to 29 and people aged 50 to 59. The first group was made up mainly of university students or people with incomplete higher education. Most of the members of the second group had completed graduate studies.

In terms of education, it is worth noting that the study conducted in Pakistan (Nawaz *et al.*, 2017) did not consider this variable. Conversely, the studies carried out in China (Gao *et al.*, 2020), Turkey (Yildirim *et al.*, 2016) and Kuwait (Al-Balhan *et al.*, 2018) included a sample of university students only. Therefore, all participants had completed high school. Studies developed in Iran (Lin *et al.*, 2018) and Spain (González-Cabrera *et al.*, 2017) limited their samples to high school students. In other words, all participants had completed primary education. Therefore, the authors of these studies could not state that participants were more or less susceptible to nomophobia depending on their level of education because the samples were limited to a single education profile. Research conducted in Italy (Adawi *et al.*, 2018) considered education dividing it into Primary, Fundamental, Secondary, or Higher Education. The authors started with the hypothesis that university students would be more susceptible to nomophobia. However, at the end of that study, they did not find a statistically significant difference or association in this variable.

Some considerations deserve to be made on the results obtained related to the gender category. A concern about gender was present in all the analyzed studies (Adawi *et al.*, 2018; Al-Balhan *et al.*, 2018; González-Cabrera *et al.*, 2017; Gao *et al.*, 2020; Lin *et al.*, 2018; Nawaz *et al.*, 2017; Rocha *et al.*, 2020; Silva *et al.*, 2020; and Yildirim *et al.*, 2016). However, the results presented in these studies differ from each other. Five articles pointed out that nomophobia was more prevalent in women than in men (Adawi *et al.*, 2018; Al-Balhan *et al.*, 2018; González-Cabrera *et al.*, 2017; Gao *et al.*, 2020; and Yildirim *et al.*, 2016). However, the study carried out in Pakistan (Nawaz *et al.*, 2017) identified the opposite. The Iranian study (Lin *et al.*, 2018) did not find a significant difference between genders in its statistical analyses. In these studies, the authors justify that the results related to the gender issue can be explained based on the cultural behavior of the respective societies in which these women are inserted. In both Pakistan and Iran, men hold more power than women and, therefore, enjoy broader access to devices to access the digital world while women have little or no freedom and power.

A large part of our sample was made up of women. Despite this, when comparing the levels of nomophobia between men and women, we noticed that the percentages are similar. This indicates that, during the pandemic, nomophobia disorder affected both women and men.

About the time spent using a smartphone, our study corroborates the conclusions presented in studies carried out in China (Gao *et al.*, 2020), Italy (Adawi *et al.*, 2018), Spain (González-Cabrera *et al.*, 2017), and Pakistan (Nawaz *et al.*, 2017). In such studies, smartphone usage time can be considered a predictor of nomophobia. These studies concluded that participants who admitted to spending more time on their *smartphones* revealed moderate or severe nomophobic behavior.

Another variable investigated in our study was the participant's income. As we mentioned previously, our income stratification was based on the population census carried out by IBGE (2010). The results indicated that participants with income between 10 and 20 minimum wages showed higher degrees of nomophobia. A possible explanation for this situation is related to the fact that this group has greater purchasing power and is, therefore, better able to purchase mobile devices and pay for better internet connection services.

The relationship between turning off your smartphone at bedtime and the presence of nomophobic behavior was evaluated. This item was just added to our search and the objective was to analyze whether there was a relationship between the habit of keeping the cell phone on while the user sleeps and higher nomophobia scores. The results indicate that all those who answered "yes" because they turned off their smartphone at bedtime showed low nomophobia scores. Conversely, those who did not adopt this behavior had high nomophobia scores.

NOMOPHOBIA IN THE CONTEXT OF THE COVID-19 PANDEMIC

One of the aspects that set our study apart from others was the relationship we sought to establish between nomophobia and social isolation carried out in the context of the covid-19 pandemic. Our hypothesis was related to the fact that the loss of connection provokes nomophobic reactions in the context of social isolation. The nine articles that used the NMP-Q questionnaire did not take into account the context of social isolation as they were published before the pandemic period. For this reason, the conclusions of these articles will not be considered in the following section.

Let's see what the impact of social isolation was on our research participants. With the spread of covid-19, many people abruptly changed their lifestyles. Social isolation was established by health authorities as one of the main forms of prevention against infection with the new coronavirus (WHO, 2020). As a result, many people lost physical contact with their family and friends. The following question was included in our questionnaire: "Did social isolation during this period have any impact on your life?" From the results, it is

concluded that the participants who admitted to having suffered an emotional impact due to social isolation were those who presented higher levels of nomophobia (90.4%).

We also observed that the financial impact of social isolation was low (5.9%). This data suggests that the majority of participants in our research were not unemployed or without income, possibly because they started working remotely.

The results obtained with the application of the NMP-Q and its relationship with social isolation considering the variables gender, age, income, education, and time of smartphone use are presented below.

The results are restricted to the 46.8% of participants who admitted that social isolation during this period had some emotional impact on their lives.

The results indicate that women made up the vast majority of participants who had some emotional impact due to social isolation (87.5%). Perhaps this is because isolation contributed to an increase in women's workload (Comoli; Canto, 2020) and an increase in their exposure to domestic violence (Vieira; Garcia; Maciel, 2020).

Let us now look at the results obtained about education. The research indicates that participants with graduate degrees constitute the group most emotionally impacted by social isolation, without considering the issue of nomophobia, a result that corroborates the conclusions presented in the study by Bezerra *et al.* (2020). According to these authors, individuals with higher education and graduate degrees accounted for 39% of respondents who stated that they had suffered mental problems resulting from isolation.

With regard specifically to nomophobia, the results demonstrate that high school and higher education students were the most impacted. One explanation for this result may be related to the fact that pedagogical activities have migrated to the virtual environment, overloading students and affecting their mental health.

Below are the results concerning income. In our study, 93.3% of survey participants with income up to two minimum wages presented moderate and severe nomophobia. The study by Filgueiras and Stults-Kolehmainen (2021) reports similar results. The authors state that the impacts of social isolation on mental health have been greater in individuals with lower incomes who live in precarious living conditions. They occupy lower-paying positions or work in the informal job market, characteristics that have been considered predictors for the development of mental health disorders (Arrais *et al.*, 2020). According to the authors, in the context of the pandemic, people with lower incomes – who live in unhealthy places, often without having the means to wash their hands, a preventive measure recommended by the World Health Organization (WHO) – tend to have higher compromised mental health. The wealthier classes, in turn, have access to basic sanitation services and the health care network, including services such as psychotherapy (Filgueiras; Stults-Kolehmainen, 2021). This way, they can resort to treatments such as psychoanalysis. In this way, problems related to stress caused by social isolation and dependence on information and communication technologies could be reduced.

However, our results indicate that social isolation encouraged nomophobic behaviors in 58.7% of participants who had an income between 4 and 10 minimum wages. A possible justification for this may be associated with the fact that the population with higher income can purchase mobile devices and connection services to carry out their leisure activities online, preventing isolation from becoming something so tedious.

The results according to the age of participants showed that people over 50 years of age constituted the largest portion emotionally impacted by social isolation.

This result corroborates the conclusions presented by Fogaça, Arossi, and Hirdes (2021). These authors emphasize that the older population is in groups at risk of contamination from covid-19. For this reason, perhaps older people felt more afraid of being infected, which would negatively impact their emotional

well-being. Fogaça *et al.* (2021) also highlight that inadequate information about the disease and its care has had negative impacts on the mental health of older individuals.

As we mentioned previously, the low participation of young people in our study represents one of the most important limitations. For this reason, we were unable to assess the emotional impact caused by isolation on the lives of participants in this age group. The data indicate nomophobic behavior homogeneity between age groups, except for the 40 to 49-year-old group, which presented a lower score for severe levels of nomophobia.

The results regarding time spent on the smartphone showed that participants who use their *smartphones* between 4 and 8 hours a day constitute the main group emotionally impacted by social isolation. This is explained by the fact that social isolation has forced the transfer of work and/or educational activities to the online environment, causing people to spend more time connected (Santos *et al.*, 2021). Alves and Farias (2020) report that the emotional and physical exhaustion caused by long hours sitting in front of a computer or smartphone can lead to Burnout Syndrome.

A total of 88.3% of respondents said they had used the internet more during social isolation. Thus, it was possible to identify that internet use during the covid-19 pandemic period increased considerably among participants. This situation can be explained by the fact that many people have used digital media as a means to connect with family, friends, and clients or to carry out educational and professional activities (Tenório, 2021).

We evaluated the relationship between participants who complied with health regulations and remained at home and the degrees of nomophobia indicated by them. Out of the 222 survey participants, 41.9% stated that they stayed at home most of the time; 39.2% reported that they only went out to access food and medicines and/or perform physical activities; and 18.9% did not comply with isolation. This total was divided according to the variables used in the study.

The results on adherence to social isolation practices in relation to gender and the level of nomophobia indicate that there was no significant difference between genders: approximately 42% of women and 44% of men remained at home most of the time. Likewise, 39% of women and 38% of men left home just to access food and medicines, and/or physical activities. Finally, 19% of women and 18% of men did not stay at home for the longest time.

As we mentioned previously, the results of moderate and severe nomophobia increased as users revealed that they spend more time on their *smartphones*. Hence, it is possible to consider that nomophobia is related to the fact that the participant remained at home during social isolation.

Our study sought to outline a profile of participants who were most vulnerable to nomophobic behaviors. We identified that this profile is made up of women aged 20 to 29 and 50 to 59 years old, university or graduate students, who had an income of up to 2 minimum wages or 10 to 20 minimum wages.

The results on adherence to social isolation according to income indicate a relationship between staying at home and high rates of nomophobia. Participants who spent most of their time at home had high levels of moderate or severe nomophobia (>80%). However, we noticed that participants who did not stay at home also demonstrated nomophobic behaviors. The results of this investigation indicate that participants from both income groups who did not remain isolated at home also showed moderate and severe rates of nomophobia. This result suggests that income is not a factor indicating the level of severity of nomophobia in participants.

The results on nomophobia and adherence to social isolation in terms of age in the two groups selected for the comparison (age groups of 20 to 29 years and 50 to 59 years) showed that the entire younger population in our sample presented moderate or severe nomophobic behaviors. No cases of mild nomophobia

were identified in this age group. This may be because the participants are of university age, probably studying Higher Education and, therefore, spending most of their time online carrying out learning activities.

The time spent on the *smartphone* has been considered by some authors (Adawi et al., 2018; Gao et al., 2020) as a possible predictor for nomophobic behaviors. In our study, the two longest periods of smartphone use observed were 4 to 8 hours and 8 to 16 hours per day, respectively. The results indicate that participants who spent more time on their *smartphones* showed higher indicators of nomophobic behavior, whether or not they obeyed social isolation guidelines. However, it is worth noting that respondents who partially complied with isolation expressed higher levels of nomophobia than those who remained at home most of the time.

FINAL CONSIDERATIONS

Over the years, ICT has become an indispensable part of everyday social life. *Smartphones* in particular have made it possible to carry out different daily tasks on a single device. Nevertheless, despite its many advantages, ICT can also lead to some problems that have attracted increasing academic interest in recent decades. In this scenario, studies that explore nomophobia stood out: the anguish and fear of becoming incommunicable when separated from the smartphone or without an internet connection (King; Nardi, 2014).

Some researchers have dedicated themselves to developing ways to measure the phenomenon of nomophobia. One of the tools developed to date is the NMP-Q questionnaire created by Yildirim and Correia (2015), which is in wide circulation in international academia.

The NMP-Q is a tool currently under debate in several parts of the world. Authors who analyze it have some criticisms and identify its limitations. This article aimed to use this tool applied to the unique context of Brazil during the social isolation proposed as a preventive measure against covid-19 contamination.

The investigation that became the present article has some limitations that deserve to be mentioned. The first relates to the context in which our sample was constructed.

As mentioned previously, the sample was obtained by convenience (non-probability) using the snowball method. We counted on the collaboration of participants who voluntarily responded to our survey and invited other people through their social networks. Therefore, our sample cannot be considered comprehensive or representative as there was no control of the individuals who participated in the study. Despite this, it is worth highlighting that we managed to reach a number of participants comparable to that observed in other international studies that used the same tool.

The data above reveal that the number of participants in the studies that served as a basis for the reflections presented in this article can be considered comparable to ours. Two exceptions are worth highlighting: the Chinese and Iranian cases. In the first, participants were recruited from three universities in the north of the country; in the second, the sample consisted of students from twenty randomly selected secondary schools, and thus many people joined the study and participated.

The second limitation of our study was our choice to restrict the research only to participants who had already reached the legal age of adulthood. This decision was based on the limitations imposed by the Research Ethics Committee (CEP) related to the inclusion of underaged individuals in research involving human beings. The inclusion of underaged individuals requires formal authorization from a legal guardian. Furthermore, we had a very small participation of young people aged 18 and 19. Previous studies have indicated that this population would be more vulnerable to developing nomophobic behaviors. However, with the residual participation of young people in our study, it was not possible to confirm or dispute the level of prevalence or vulnerability of nomophobia in this age group compared to others.

In terms of merits, our research is innovative, as none of the studies that used the NMP-Q questionnaire or that analyzed the impacts caused by social isolation made a correlation with nomophobia. In this regard,

it was possible to confirm that internet use during the covid-19 pandemic period increased considerably – the internet was needed for working and studying remotely, shopping, and connecting with family and friends.

For future studies, we encourage taking into account the housing conditions in which social isolation was carried out; this would allow the analysis of behaviors of those who spent isolation living alone and those who lived with family or friends. Residential internet access must also be analyzed. We also consider it interesting to explore the possible increase in isolation and nomophobia in cases of family members who contracted covid-19 and/or suffered losses in the family as a result of the disease. This article aims, above all, to present a proposal for methodological improvement and discussion and not just to formulate a comprehensive conclusion about the growth of nomophobia among Brazilians during the covid-19 period.

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