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Nomophobia among medical students and its association with depression, anxiety, stress and academic performance

Nomofobia entre discentes de medicina e sua associação com depressão, ansiedade, estresse e rendimento acadêmico

Marcos Kubrusly[1] mmkubrusly@gmail.com
Paulo Goberlânio de Barros Silva[1] paulo_goberlanio@yahoo.com.br
Gabriel Vidal de Vasconcelos[1] gabrielvidal17@gmail.com
Emanuel Delano Lima Gonçalves Leite[1] emanueldelano.ed@gmail.com
Priscilla de Almeida Santos[1] pri_santos@hotmail.com
Hermano Alexandre Lima Rocha[2] hermano@ufc.br

ABSTRACT

Introduction: As the world becomes increasingly interconnected, the adoption of technology remains one of the defining factors of human progress. Nomophobia (NO MObile PHOne PhoBIA) represents a mental condition caused by the fear of being detached from mobile phone connectivity. Such condition is directly associated with depression, anxiety, and stress. Moreover, nomophobia can lead to structural brain damage.

Objective: The present study aims to assess the effect of nomophobia on medical students at a private institution and its association with depression, anxiety, stress and academic performance.

Method: This is a cross-sectional observational study carried out in medical students at Centro Universitário Christus. Nomophobia was measured using the Nomophobia Questionnaire (NMP-Q). The NMP-Q has 20 questions, which are asked on a 7-point Likert scale. This scale has been validated for the Brazilian Portuguese language. Depression, anxiety and stress were measured by the DASS-21, a simplified version of the DASS instrument. The DASS-21 questionnaire was also validated for the Brazilian Portuguese language. Academic performance was measured through API, the product of a complex mathematical operation that results in the student's average grade in the semester and functions as a reference index for pedagogical follow-up in the assessed institution. In addition, the device use habits were assessed. Descriptive results were presented, and bivariate analyses of association and correlation were performed. This study was approved by the research ethics committee.

Result: A sample of 292 students was assessed. Virtually all students (99.7%) had some degree of nomophobia, and 64.5% had a moderate or severe level of nomophobia. More than 50% of the students had higher than mild degrees of stress, and 19.5% and 11.2% of the students had severe or very severe levels of anxiety and depression, respectively. When analyzing the correlation of NMP-Q with DASS-21 scores, it was observed that increases in NMP-Q lead to increases in the overall DASS score ($p < 0.001$), and that worse results in DASS-21 are associated with worse API.

Conclusion: Our study suggests that nomophobia is likely to increase anxiety, stress and depression and, as a result, leads to a decrease in academic performance.

Keywords: Smartphone; Psychological Distress; Educational Measurement.

RESUMO

Introdução: *À medida que o mundo se torna cada vez mais interconectado, a adoção de tecnologia continua sendo um dos fatores definidores do progresso humano. A nomofobia representa uma condição mental causada pelo medo de ficar sem celular. Tal condição está diretamente associada à depressão, à ansiedade e ao estresse. Ainda, a nomofobia pode levar a danos cerebrais estruturais.*

Objetivo: *O presente estudo visa conhecer o efeito da nomofobia nos estudantes de Medicina de uma faculdade privada e sua associação com depressão, ansiedade, estresse e rendimento acadêmico.*

Método: *Trata-se de um estudo observacional de corte transversal, do qual participaram estudantes do curso de Medicina do Centro Universitário Christus. O distúrbio foi mensurado por meio do Questionário sobre Nomofobia (NMP-Q). Esse instrumento tem 20 questões, todas baseadas na escala do tipo Likert de 7 pontos, a qual foi validada para o português brasileiro. A depressão, a ansiedade e o estresse foram mensurados pelo instrumento DASS-21, uma versão simplificada da DASS. Validou-se também o questionário DASS-21 para o português brasileiro. O rendimento acadêmico foi mensurado por meio do IRA, fruto de uma complexa operação matemática que resulta em uma nota média do aluno no semestre e funciona como um índice de referência para o acompanhamento pedagógico na faculdade estudada. Além disso, estudaram-se os hábitos de uso do dispositivo. Apresentaram-se os resultados descritivos, e realizaram-se análises bivariadas de associação e correlação. Esse estudo foi aprovado pelo Comitê de Ética em Pesquisa.*

Resultado: *Obteve-se uma amostra de 292 estudantes. Praticamente todos os alunos (99,7%) apresentaram algum grau de nomofobia, e 64,5% demonstraram nível moderado ou grave de nomofobia. Mais de 50% dos estudantes apresentaram graus superiores ao nível leve de estresse, e 19,5% e 11,2% dos estudantes manifestaram ansiedade e depressão graves ou muito graves, respectivamente. Quando se analisou a correlação dos escores no NMP-Q com os escores da DASS-21, observou-se que aumentos nessa pontuação levam à elevação do escore geral da DASS ($p < 0,001$) e que piores resultados na DASS-21 estão associados ao pior IRA.*

Conclusão: *Nosso estudo sugere que a nomofobia pode provavelmente aumentar a ansiedade, o estresse e a depressão, e, como consequência, levar uma baixa do rendimento acadêmico.*

Palavras-chave: *Smartphone; Angústia Psicológica; Avaliação Educacional.*

[1] Centro Universitário Christus, Fortaleza, Ceará, Brazil.
[2] Universidade Federal do Ceará, Fortaleza, Ceará, Brazil.

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INTRODUCTION

As the world becomes increasingly interconnected, both economically and socially, the adoption of technology remains one of the defining factors of human progress[1]. Particularly, the smartphone is the currently available main means of technology use, with its use being common nowadays as, according to the United Kingdom, 93% of the population has a smartphone[2]. Smartphones have many incentives to offer, such as improving social skills, entertainment and social identity preservation[3].

However, it is a habit that can become an addiction, being a common problem among adults worldwide[4], and, based on that, many harmful events can occur in the social, mental and academic areas[5]. Nomophobia then arises as a result of this misuse. The term 'nomophobia', which comes from the English phrase 'NO MObile PHOne PhoBIA', is a mental condition caused by the fear of being detached from mobile phone connectivity[6], in which the individual is afraid to be without the electronic device, most commonly the smartphone. Moreover, nomophobia is directly associated with depression, anxiety and stress[7,8]. Also from this perspective, the World Health Organization (WHO) considers addiction as a disease, making it important to further investigate this problem, which is common in society. Furthermore, it is necessary to understand that smartphone addiction is closely related to nomophobia and may even have the same characteristics[9].

An investigation showed that 60% of its sample of medical students had moderate and 22.1% had severe nomophobia[10]. An even higher prevalence was found among medical students from a medical institution: 100% of the students had this condition[11]. This problem can lead to several adverse effects; among them, the decrease in connectivity between the orbitofrontal cortex and the nucleus accumbens. Additionally, withdrawal symptoms and higher serum cortisol levels were also observed[12]. From a structural point of view, a European study showed that individuals with smartphone addiction had less gray matter in the inferior temporal region, in the parahippocampal cortex and in the left anterior insular region[13].

Nomophobia is a very prevalent pathology among students, especially those in the healthcare field. Although knowledge and mastery of this subject are important, few studies have been carried out with health care students in Brazil; therefore, further clarification is required to understand the topic. This scarcity of information supports the relevance of the present study, which aims, therefore, to assess the prevalence of nomophobia among medical students and its association with depression, anxiety, stress and academic performance.

METHOD

Study and sample characterization

This is an observational cross-sectional study of medical students from Centro Universitário Christus. For sample size calculation, the prevalence of nomophobia of 24.12%, recently identified among dental students in a cross-sectional study was considered, as well as a type II error of 20% (80% power) and a significance level of 95%, leading to a minimum sample of 305 individuals[14]. Properly enrolled students who attended at least 75% of classes and had a smartphone were included. Students considered unable to answer the questionnaires due to physical, mental or psychological disability were excluded from the study. Students who did not accept to participate in the study were considered as absent cases for subsequent sensitivity analysis.

The medical course at Centro Universitário Christus is a reference course, with 14 years of existence and has hybrid curriculum (conventional classes and Problem-Based Learning). Students were approached in person from March to June 2019 and after agreeing to participate in the study, they signed the free and informed consent form and filled out a sociodemographic questionnaire and two validated questionnaires: the Depression Anxiety and Stress Scale 21 (DASS-21) and the Nomophobia Questionnaire (NMP-Q).

Measurements

NMP-Q and DASS-21

Nomophobia was measured using the Nomophobia Questionnaire (NMP-Q)6. The NMP-Q has 20 questions, which are asked on a 7-point Likert scale, with 1 being "strongly disagree" and 7 "strongly agree". This scale was validated for the Brazilian Portuguese language in 2020[15]. The interpretation, according to the authors, is based on the number of scored points. The total score of the NMP-Q is 20 as the minimum score (20 * 1) or 140 (7 * 20) as the maximum score, and the results can be classified as: less than 20 points: no nomophobia; 21-59: mild level of nomophobia; 60-99: moderate level of nomophobia and 100-140, severe nomophobia.

Depression, anxiety and stress were measured using the DASS-21[16], a simplified version of the DASS instrument. The DASS-21 questionnaire was validated for the Brazilian Portuguese language[17]. The questionnaire contains of a set of three 4-point Likert-type subscales (0-3) of self-response, starting with 0 (not applicable at all) to 3 (totally applicable, or applicable most of the time), in which the symptoms of stress, depression and anxiety are grouped together. The first one is defined by the presence of negative affection, such as depressed mood, insomnia, discomfort and irritability, which are nonspecific symptoms associated with stress; the second one encompasses

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factors that constitute structures representing specific symptoms of depression (anhedonia, absence of positive affection); and, finally, the last structure refers to the specific symptoms of anxiety (somatic tension and hyperactivity).

Academic Performance Index (API)

The API is the result of a complex mathematical operation that results in a student's average grade in the semester and serves as a reference index for pedagogical monitoring at Unichristus. It is a grade obtained through a calculation, representing a student's average grade in the course to date. The API is calculated using the following formula:

$$API = \frac{[FG(D1S1) + FG(D2S1) + \cdots + FG(DNS1)]}{NDS1} + \frac{[FG(D1S2) + FG(D2S2) + \cdots + FG(DNS2)]}{NDS2} \ldots + \frac{[FG(D1Sn) + FG(D2Sn) + \cdots + FG(DNSn)]}{NDSn}$$

In which FG(D1S1) means the final grade (or final average) of the 1st discipline/module obtained in the student's 1st semester record only for the PASSED disciplines in the record, except for the subject called Complementary Activity, FG (D2S1) is the final grade (or final average) of the 2nd discipline/module obtained in the student's 1st semester record only for the PASSED disciplines in the record, except for a discipline called Complementary Activity. And so forth, up to the last discipline that the student passed in the 1st semester, which will be FG(DNS1), which means the final grade (or final average) of the Nth discipline/module obtained in the students 1st semester record only for the disciplines in which the student PASSED in the record, except for the discipline called Complementary Activity. NDS1 means the number of disciplines (passed and failed only, except for the disciplines called "Complementary Activity") taken in the 1st semester of the student's record. The FG(D1S2) means the final grade (or final average) of the 1st discipline/module obtained in the student's 2nd semester record only for the disciplines in which the student PASSED in the record, except for the discipline called Complementary Activity.

FG(D2S2) means the final grade (or final average) of the 2nd discipline/module obtained in the student's 2nd semester record only for the disciplines the student passed in the record, except for the subject called Complementary Activity. And so forth, up to the last discipline in which the student passed in the 2nd semester, which will be FG(DNS2), which means the final grade (or final average) of the Nth discipline/module obtained in the student's 2nd semester record only for the disciplines that the student passed in the record, except for the discipline called Complementary Activity. NDS2 means the number of disciplines (passed and failed only, except for the disciplines called "Complementary Activity") taken in the 2nd semester of the student's record.

FG(D1SN) means the final grade (or final average) of the 1st discipline/module obtained in the student's Nth semester record only for the disciplines the student passed in the record, except for the discipline called Complementary Activity. The FG(D2SN) is the final grade of the 2nd discipline/module obtained in the student's Nth semester record only for the disciplines the student passed in the record, except for the discipline called Complementary Activity. And so forth, up to the last discipline the student passed in the Nth semester, which will be FG(NDSN), which means the final grade of the Nth discipline /module obtained in the students Nth semester record only for the disciplines the student passed in the record, except for the discipline called Complementary Activity. NDSN means the number of disciplines (passed and failed only, except for the disciplines called "Complementary Activity") taken in the Nth semester of the student's record. NAS means the number of academic semesters attended by the student.

Sociodemographic variables

The socio-demographic questionnaire consisted of five questions that addressed the semester the student would be attending at the time, the tutoring group (an environment in which learning is based on Problem-Based Learning, an active methodology for seeking knowledge), and the student's number, which was necessary, so that we could associate the Academic Performance Index (API) data in a fully anonymous manner. In addition to these, data on the student's age and gender were also collected.

Statistical analysis

Nomophobia, anxiety, stress and depression scores were expressed as mean and standard deviation and compared between API categories using the Mann-Whitney test, as well as being categorized as recommended in their validation articles. The API of students was divided into tertiles (<7.8; 7.8-8.3; >8.3) for the expression of absolute and percentage frequency and crossing with sociodemographic factors using Pearson's chi-square test or Fisher's exact test for categorical and Mann-Whitney for numerical variables. Correlation analyses with cubic extrapolation were also performed. A sensitivity analysis was performed with cases that refused to participate (13 students), and the variation in the associations was not significant. Values of $p<0.05$ were considered significant. The data obtained at the collection were tabulated and analyzed using IBM SPSS Statistics for Windows, Version 23.0 software, Armonk, NY: IBM Corp. IBM Corp. Released 2015.

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Ethical aspects

This study was approved by the research ethics committee of Centro Universitário Christus and registered under CAAE 87329618.4.0000.5049. All information was collected based on the Brazilian Resolution 466/12, which regulates the principles of ethics in research with human beings. Free and informed consent terms were offered and obtained from all participants.

RESULTS

This study had a sample of 292 medical students from Centro Universitário Christus, among which 59.9% were females and 40.1% were males, 32.9% were attending the 1st to 3rd semesters, while 67.1% comprised students from the 4th to the 8th semesters. Moreover, 69.6% were over 20 years of age (mean 22, standard deviation 4).

Practically all students (99.7%) had some degree of nomophobia, and 64.5% had a moderate or severe level of nomophobia. A total of 11.8% had severe nomophobia. More than 50% of the students had greater than mild degrees (from minimal to very severe) of stress, and 19.5% and 11.2% of students had severe or very severe anxiety and depression, respectively (Table 1).

When analyzing the profile of cell phone use by the students, it was observed that most of them (60.5%) use it for a total accumulated time for a period of less than four hours, and this accumulated use is associated with API, with the lowest time of use being associated with the best API (p=0.021). However, most individuals check their cell phones every 5, 10, or 20 minutes. Among the purposes, the most prevalent were talking or sending messages to family and friends, followed by researching information, with more than 80% of respondents using it for this purpose. The use of e-mail, prevalent in almost 70% of the students, was associated with worse API (p-value of 0.04), as well as the use to schedule meetings (p = 0.001) (Table 2).

When analyzing the correlation of NMP-Q scores with DASS-21 scores, it is observed that increases in these scores lead to increases in the overall DASS score (p<0.001) (Chart 1), as well as in each of the domains of depression (p<0.001), anxiety (p<0.001) and stress (p<0.001).

Finally, when analyzing the association between the DASS-21, in its domains, and API, it was verified that the first tertile of API, which represents the students with lower performance, shows higher scores and worse results of DASS-21 in all evaluated domains. The mean anxiety score in students at the first tertile is 9.9, against 6.3 in students in the top tertile (p-value of 0.044), and the prevalence of severe or very severe stress is 31.6% in students at the first tertile, being about two-fold that found in students at the third tertile (16.2%),with a p-value of 0.035 (Table 3).

Table 1. Prevalence of nomophobia, stress, anxiety and depression among the 292 assessed students.

	n (%) or mean ± standard deviation
NMQ Score	71.2 ± 24.1
NMQ in categories	
No nomophobia	1 (0.3)
Mild nomophobia	104 (35.1)
Moderate nomophobia	156 (52.7)
Severe nomophobia	35 (11.8)
API in tertiles	
1st	112 (38.4)
2nd	92 (31.5)
3rd	88 (30.1)
DASS-21	
Score in the stress domain	16.4 ± 10.8
Score in the anxiety domain	8.2 ± 9.2
Score in the depression domain	8.6 ± 9.1
Stress domain in categories	
Normal/Mild	131 (47.2)
Minimum	37 (13.3)
Moderate	48 (17.3)
Severe	40 (14.4)
Very severe	21 (7.5)
Anxiety domain in categories	
Normal/Mild	154 (55.7)
Minimum	23 (8.3)
Moderate	45 (16.3)
Severe	23 (8.3)
Very severe	31 (11.2)
Depression domain in categories	
Normal/Mild	178 (64.4)
Minimum	35 (12.6)
Moderate	32 (11.5)
Severe	13 (4.7)
Very severe	18 (6.5)

DISCUSSION

The present study analyzed the relationship of nomophobia with depression, anxiety, stress and API. A total of 292 students attending the 1st to the 8th semesters of the medical course at Centro Universitário Christus, in Fortaleza, Brazil, were evaluated. Our sample consisted of students of a wide age range and male and female. There was an important association of nomophobia with levels of anxiety, depression and stress, and the last three were associated with worse academic performance. Moreover, it was found that the cell

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phone uses most often associated with the worst performance are checking the e-mail and scheduling appointments.

It was demonstrated in our study that medical students had a positive correlation between Nomophobia and Depression, that is: the higher the nomophobia scores, the greater the depression level. Corroborating our findings, in a study conducted with 329 American students, it was shown that problematic smartphone use is related to the severity of depression[18]. Demonstrating the correlation found in the present study, another study carried out with nursing students in India, also showed that nomophobia increases the levels of depression due to the pressure the individual suffers from being continuously connected[19]. Furthermore, also reinforcing our findings, in a Chinese systematic review and meta-analysis of a total of 13 studies showed a correlation between problematic smartphone use and depression[20]. This evidence suggests that there is a likely correlation between increased smartphone use and depression.

Table 2. Cell phone use profile and its association with API.

	Total		API				p-value
			<7.8		7.8 or more		
Accumulated time of smartphone use per day?							
Up to 4h	150	55.1%	46	46.0%	104	60.5%	0.021
>4h	122	44.9%	54	54.0%	68	39.5%	
Smartphone check frequency							
Every 5, 10 or 20 minutes	152	55.5%	59	59.0%	93	53.4%	0.373
Every 30 minutes or more	122	44.5%	41	41.0%	81	46.6%	
Purpose of smartphone use							
E-mail	203	69.5%	68	62.4%	135	73.8%	0.041
Check class notes	173	59.2%	62	56.9%	111	60.7%	0.525
Check social media	250	85.6%	92	84.4%	158	86.3%	0.649
Playing games	60	20.5%	24	22.0%	36	19.7%	0.631
Receive news	164	56.2%	56	51.4%	108	59.0%	0.203
Spend time	207	70.9%	71	65.1%	136	74.3%	0.095
Search for information on the internet	262	89.7%	95	87.2%	167	91.3%	0.264
Listen to music	205	70.2%	77	70.6%	128	69.9%	0.900
Schedule meetings and events	112	38.4%	28	25.7%	84	45.9%	0.001
Talk to family/friends	261	89.4%	94	86.2%	167	91.3%	0.178
Send messages to family/friends	252	86.3%	91	83.5%	161	88.0%	0.280
Others	14	4.8%	5	4.6%	9	4.9%	0.898

Chart 1. Simple Scatter Plot of DASS-21 per NMQ.

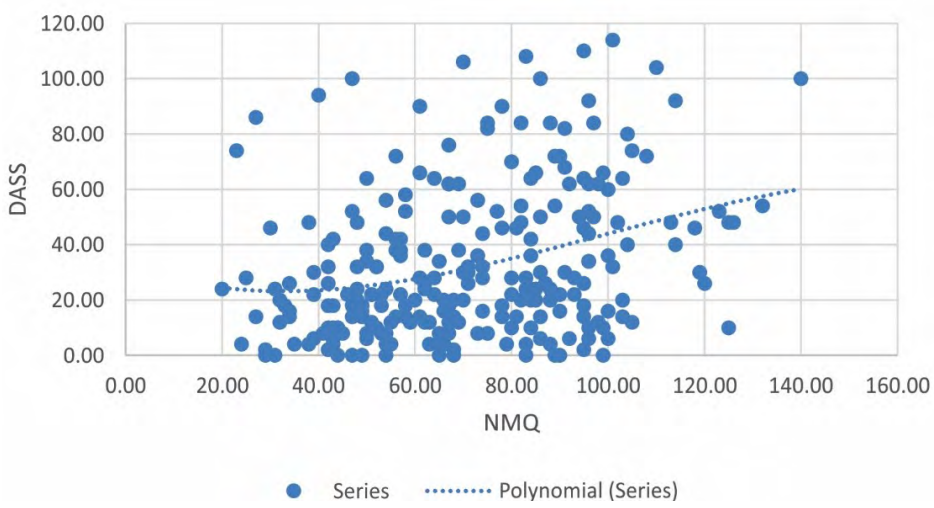

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Table 3. Association of measures in the evaluated domains of the DASS-21 and API tertiles.

	API in tertiles			p-value
	First	Second	Third	
	n (%) or mean ± standard deviation	n (%) or mean ± standard deviation	n (%)or mean ± standard deviation	
Stress domain score	18.1 ±12.35	16 ±9.98	14.7 ±9.33	0.223
Anxiety domain score	9.9 ±10.33	8 ±8.27	6.3 ±7.91	0.044
Depression domain score	10.1 ±9.87	9.3 ±9.94	6.3 ±6.6	0.059
Stress domain in categories				0.035
Normal/Mild	41 (40.5)	42 (50)	45 (52.3)	
Minimum	13 (12.8)	11 (13)	12 (13.9)	
Moderate	15 (14.8)	17 (20.2)	15 (17.4)	
Severe	19 (18.8)	7 (8.3)	14 (16.2)	
Very severe	13 (12.8)	7 (8.3)	0 (0)	
Anxiety domain in categories				0.326
Normal/Mild	49 (49)	45 (53.5)	56 (65.1)	
Minimum	6 (6)	9 (10.7)	8 (9.3)	
Moderate	19 (19)	14 (16.6)	11 (12.7)	
Severe	11 (11)	8 (9.5)	4 (4.6)	
Very severe	15 (15)	8 (9.5)	7 (8.1)	
Depression domain in categories				0.203
Normal/Mild	56 (56)	53 (62.3)	64 (75.2)	
Minimum	16 (16)	10 (11.7)	9 (10.5)	
Moderate	12 (12)	11 (12.9)	9 (10.5)	
Severe	7 (7)	5 (5.8)	1 (1.1)	
Very severe	9 (9)	6 (7)	2 (2.3)	

In addition to these previously demonstrated findings, a study showed that students who show prolonged smartphone use (>4h) have a lower academic performance. Moreover, it was observed that students who use their smartphone to look at e-mails and schedule meetings and events have a higher academic performance, with an API > 7.8 on average. This fact may be due to a more responsible use of the smartphone, as it is likely that using the smartphone to schedule meetings and check e-mails are eventual checks on the cell phone, that is, there is no feedback, so that the student spends less time connected. The role of the smartphone in academic achievement is currently the subject of several studies. In a study carried out with a large-scale survey in a public Chinese university, a correlation was found between the exacerbated use of smartphones and the students' negative academic performance, through nomophobia[21]. Differently from the abovementioned findings, an investigation that used the same research instrument as the present study (NMP-Q), with a sample of 157 students, did not find an association between smartphone use and worse academic performance among students from a Physiotherapy course [5]. In the present study, no direct correlation was found between nomophobia and API; however, an indirect correlation was demonstrated, since students with low API show a correlation with anxiety, which, in turn, is statistically correlated with nomophobia.

As demonstrated in this study, a statistically significant association was found between Nomophobia and Anxiety, showing that students with high levels of nomophobia tend to have higher levels of anxiety. This relationship was reinforced in a systematic review including 42 articles, using the same instrument used in the present study for measurement (NMP-Q); in the vast majority of the studied articles, a positive correlation was found between nomophobia and anxiety[22]. The exacerbated use of smartphones and its relationship with this nomophobia as seen in our article is being studied worldwide. In an analysis carried out in China with adolescents, the existence of an important association between social anxiety and smartphone dependence was proposed[23]. Confirming the data found in our article, the use of cell phones has been

described as being associated to high levels of anxiety, with time of use being the main associated factor[24].

In addition to the relationship between nomophobia and anxiety, the present study showed that the individuals' stress levels were also correlated with nomophobia, that is, the higher the levels of the former, the higher the levels of the latter. Such association implies believing that the exacerbated use of smartphones leads to stress mechanisms, having a significant impact on the individual's quality of life and mental health. A systematic review and meta-analysis carried out with 41 articles showed that problematic smartphone use increases the levels of perceived stress among students[22]. Furthermore, an investigation of 270 smartphone users showed that nomophobia and stress have an intrinsic association, demonstrating a correlation between nomophobia, stress and working conditions[8].

Some findings of this study show that depression, anxiety and stress are correlated, and the greater the one, the greater the levels of the other two conditions. Corroborating our findings, an investigation evaluated depression, anxiety and stress among medical students in India and found a high correlation between these three conditions in the sample, considering these diseases probably have a pathophysiological correlation among each other. On the other hand, in an investigation carried out with medical students conducted in Nigeria, no correlation was found between depression, anxiety and stress[25].

This study has some limitations. The most important one is probably the use of the cross-sectional methodology, which can lead to reverse causality. We believe this is not the case in the present study, as we have evaluated students since the first semester (this being the most representative group), so the impact of API on the generation of stress, anxiety, depression or nomophobia is not likely a temporal one. We had an acceptable rate of missing values, and we used sensitivity analyses that showed little effect on the associations. As this was a self-administered questionnaire, one could experience information bias, but during the application, the confidentiality of information was guaranteed. Finally, although the API is not a perfect measure of academic performance, it is able to record student achievement in an acceptable and stable manner.

CONCLUSIONS

Our study suggests that nomophobia may likely increase anxiety and consequently lead to lower academic achievement. Therefore, educational technology policies are of the utmost importance inside the academic environment, aiming to warn students about abusive use, addiction occurrence and to help students to seek a therapeutic plan. Furthermore, our study observed that nomophobia is correlated with anxiety, depression and stress. Educational institutions need to alert students and help them with this problem, as these comorbidities can lead to extremely harmful consequences for the individual, such as suicide. Moreover, further studies will be needed to confirm the findings of this study and thus, this subject can be more effectively dealt with.

AUTHORS' CONTRIBUTION

Marcos Kubrusly and Hermano Alexandre Lima Rocha conceived and wrote the article. Paulo Goberlânio de Barros Silva, Gabriel Vidal de Vasconcelos, Emanuel Delano Lima Gonçalves Leite and Priscilla de Almeida Santos contributed to data collection and analysis. Hermano Alexandre Lima Rocha performed the statistical analyses. Hermano Alexandre Lima Rocha, Marcos Kubrusly, Paulo Goberlânio de Barros Silva, Gabriel Vidal de Vasconcelos and Emanuel Delano Lima Gonçalves Leite read, revised and approved the final version of the manuscript.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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