Addictive Potential of Social Media: A Cross Sectional Study in Portugal

Potencial Aditivo das Redes Sociais: Um Estudo Transversal em Portugal

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ABSTRACT

Introduction: The use of social media is an extremely popular activity, with an average time spent of two and a half hours daily. The number of users continues to rise, with 4.65 billion around the world in 2022, approximately 58.7% of the world population. A rising number of studies show that a minority of these persons will develop a behavioral addiction on social media. The aim of this study was to understand if the use of a specific social media platform predicts increased addictive potential.

Material and Methods: A cross-sectional sample of 300 persons (aged 18 years-old or older, 60.33% female), completed an online survey including sociodemographic questions, data regarding the use of social media and the Bergen Social Media Addiction Scale (BSMAS). Linear and logistic regression models were performed to determine the risk for each media platform.

Results: Instagram® use was a significant predictor of higher scores on the BSMAS (*B* 2.51; *p* < 0.0001; CI 1.33 - 3.69). The use of other platforms including Facebook® (*B* -0.31), Twitter® (*B* 1.38) and Pinterest® (*B* -0.15) was not found to predict a higher risk of social media addiction.

Conclusion: Instagram® scored a higher grade in BSMAS scale, with statistical significance, which could suggest a higher addictive potential. More research is needed to establish the direction of this relationship, since the cross-sectional study design does not allow inferences about directionality.

Keywords: Behavior, Addictive; Internet; Internet Addiction Disorder; Psychiatric Status Rating Scales; Social Media

RESUMO

Introdução: A utilização de redes sociais é uma atividade bastante popular nos dias de hoje, com um tempo médio de utilização diária de duas horas e meia. O número de utilizadores continua a aumentar, perfazendo 4,65 mil milhões em 2022, aproximadamente 58,7% da população mundial. Um número crescente de estudos mostra que uma minoria destes utilizadores irá desenvolver uma adicção comportamental às redes sociais. O objetivo deste estudo é compreender se o uso de uma plataforma de rede social específica é um preditor de maior potencial adictivo.

Material e Métodos: Uma amostra de 300 pessoas (idade igual ou superior a 18 anos, 60,33% sexo feminino), completou um questionário online, com fatores sociodemográficos, dados acerca do uso de redes sociais e a *Bergen Social Media Addiction Scale* (BSMAS). Foram feitas análises de regressão linear e logística para determinar o potencial de adicção de cada plataforma.

Resultados: A utilização do Instagram® foi um preditor significativo para pontuações mais altas na BSMAS (*B* 2,51; *p* < 0,0001; CI 1,33 - 3,69). O uso de outras plataformas, incluindo o Facebook® (*B* -0,31), o Twitter® (*B* 1,38) e o Pinterest® (*B* -0,15) não pareceu ser um preditor de maior risco adictivo

Conclusão: O Instagram® atingiu uma maior classificação na BSMAS, com significância estatística, o que pode sugerir um maior potencial adictivo. É necessária mais investigação para estabelecer a direção desta relação, visto que o desenho transversal não permite inferências sobre a direccionalidade.

Palavras-chave: Comportamento Aditivo; Escalas de Classificação do Estado Psiquiátrico; Internet; Social Media; Transtorno de Dependência de Internet

INTRODUCTION

Social media (SM) has changed individuals' everyday life. It is everywhere, from the way people communicate, to how they read the news or keep up with the latest events, with an average time spent by the users of two and a half hours daily.

The first social networking site dates back to 1997,[1] and the most accessed SM platform of all times, Facebook®, was created in 2004.[2] Since then, the number of SM users has increased to 4.65 billion around the world in 2022, approximately 58.7% of the world population.[3]

Due to the rising popularity of SM, there is emerging scientific literature reporting a myriad of its consequences, namely, body image concerns – both in men[4] and women[5–7] – disordered eating,[8] sleep difficulties,[9] loneliness,[10] depression[11] and impaired self-reported work and academic performance.[12] Additionally, several scholars have suggested that a minority of users develop a behavioral addiction on SM.[2,13–17] When distinguishing between addictive and non-addictive behavior, several addiction criteria have been used. These criteria include (1) mood modification: SM is used to induce mood changes, either pleasurable feelings or a numbing effect; (2) salience: SM use may become the single most important activity that they engage in; (3) tolerance: ever-increasing time and energy are required to achieve the same feelings that occurred in the initial phases of usage; (4) withdrawal symptoms; experiencing negative psychological and physical symptoms when SM are restricted; (5) conflict; interpersonal and intrapsychic problems arise as a consequence of SM usage; (6) relapse: rapid reinstatement of problematic use after an abstinence

period.[15,17,18]

The addictive potential of a certain substance or behavior is the result of the combination of these different characteristics. Therefore, based on the undeniable differences between the SM platforms, so can the addictive potential vary. For instance, Facebook® allows users to post pictures, videos, articles, or even their own thoughts without a size limit; Instagram® is a pictorial platform where one can share personal videos and photos; Twitter® is a text network, where one can post messages up to 140 characters long and is partly focused on people discussing current events or expressing their opinions and ideologies; Pinterest® allows the user to share and save more impersonal theme-based pictures, offering ideas on interior design or outfits, for example. Some studies consider personality traits such as 'extroversion', 'socialization', 'narcissism' or 'neuroticism' could influence addictive potential to SM.[16]

As far as the authors know, no studies have assessed the addictive potential between each different SM platform. We then hypothesize that different social media platforms may also have different additive potentials. For example, the rapid delivery reward associated with Twitter® and Instagram®, the variety of possible social interactions on Facebook® or the more time-consuming pattern of using Pinterest® may contribute to different additive potentials between SM platforms.

In this study, we aimed to investigate if SM platforms were associated with addictive risks.

MATERIAL AND METHODS
Study design
A cross-sectional study was carried out. For this purpose, an anonymous online questionnaire including simple demographic data (age, sex, and education level), the SM networks used by the participants selected by leading social media site visit share in Portugal and the Bergen Social Media Addiction Scale was developed.[19]

The invitations to participate in the survey were sent by email, including a link to the questionnaire. Information about the study and informed consent were provided in the first page. All data were collected anonymously, and no monetary or material incentive was provided.

Participants
Our inclusion criteria were age equal to or above 18 years old and using at least one SM platform. Exclusion criteria were less than 18 years old and absence of SM platform usage. The questionnaire was shared on multiple online platforms and the participants were contacted via SM platforms and e-mail.

The sample was made up of 300 people, with academic qualifications from primary education to doctorate, with the majority of participants having a master's degree.

This study was approved by the Ethics Committee of the Centro Hospitalar Universitário Lisboa Norte (CHULN) and Centro Académico de Medicina de Lisboa (CAML).

Sample size calculation
Considering a significance level of 0.05 and a power of 0.8 we calculated a minimum sample of 96 people based on a 10% maximum prevalence of Facebook® addiction[20] and 33,5% maximum prevalence of Instagram® addiction.[16]

Measures
The Bergen Social Media Addiction Scale (BSMAS)[19] is a modified version of the previously validated Bergen Facebook Addiction Scale (BFAS).[21] The modification involves using the words "Social Media" instead of the word "Facebook". This scale was constructed based on addiction criteria previously noted, namely mood modification, salience, tolerance, withdrawal symptoms, conflict, and relapse.[18] BSMAS assesses SM use experiences over the last 12 months through a 6-item questionnaire with a 5-point Likert scale, ranging from (1) Very rarely, (2) Rarely, (3) Sometimes, (4) Often and (5) Very Often. Higher scores indicate greater SM addiction. The scale was translated to Portuguese and then back translated by independent translators. The back-translation was then compared with the original scale and adjustments were made, as necessary.

Analysis
The statistical analysis was executed using Stata software (version 14.2; StataCorp, Texas, USA). Descriptive statistics were presented as mean ± standard deviation.

To study the addictive potential of different media networks, the outcome was defined as the total score of the BSMAS, and the predictors were each type of social network. As many participants used different networks, we created binary variables for each network (1 = uses Facebook®, 0 = does not use Facebook®; 1 = uses Pinterest®, 0 = does not use Pinterest®; 1 = uses Instagram®; 0 = does not use Instagram®; 1 = uses Twitter®, 0 = does not use Twitter®). Sex, age, and education level, defined as categorical variables, were included as covariates.

First, we performed a multivariate linear regression model including all types of networks, analyzed separately in the model, using the binary variables, and all the potential confounding factors entered as covariates. We tested whether the data met assumptions for linear regression, namely, multicollinearity, using the variance inflation factor (VIF) post estimation test, normality, and the homoscedasticity of residuals.

Then we defined a new outcome variable using a previously suggested cut-off of 12 as an indicator of addictive

behavior problems.

Measures of association were expressed as coefficients (*B*) for linear regression and odds-ratio (OR) for logistic regression. A *p*-value ≤ 0.05 was considered statistically significant. Confidence intervals (CI) were also included in the results.

RESULTS

Socio-demographic and clinical characteristics of the sample

An initial sample of 301 persons was reduced to 300 persons, since one individual did not use any social network. The sample comprised 119 men (39.67%) and 181 women (60.33%). Most participants (75%) were in the age group that ranged from 25 to 34 years old. The sample represented a broad range of educational levels, from elementary school to doctoral degrees, and the most representative education category was master's degrees.

Regarding social media networks, most participants used two social media networks, followed by three and one social media networks.

The main SM used was Facebook® (94.67%), followed by Instagram® (73.33%).

Table 1 – Socio-demographic characteristics of the participants

Age categories, n (%)	
18 - 24 years	29 (9.67)
25 - 34 years	226 (75.33)
35 - 44 years	17 (5.67)
> 45 years	28 (9.33)
Males, n (%)	119 (39.67)
Education categories, n (%)	
Elementary school	1 (0.33)
Middle or high school	34 (11.33)
Bachelor's degree	57 (19.00)
Master's degree	202 (67.33)
Doctoral degree	6 (2.00)
Social media networks, n (%)	
Uses only one social media network	70 (23.33)
Uses two social media networks	138 (46.00)
Uses three social media networks	82 (27.33)
Uses four social media networks	9 (3.00)
Uses five or more social media networks	1 (20.33)
Social media networks, types	
Uses Facebook®	284 (94.67)
Uses Instagram®	220 (73.33)
Uses Pinterest®	76 (25.33)
Uses Twitter®	29 (9.67)

The socio-demographic characteristics of the sample are described in Table 1.

Regarding clinical characteristics, the mean value of BSMAS was 32.92 ± 11.90.

Results from the multivariate analysis

Including all predictors in the linear regression multivariate model, Instagram® was found to be a significant predictor of higher BSMAS scores (*B* 2.51; *p* < 0.0001; CI 1.33 - 3.69). Due to multicollinearity, the variable education level (VIF 72) was not included in the final analysis. The final results are represented in Table 2. Normality of residuals was confirmed. However, we detected heteroscedasticity of residuals after using a fitted value *versus* residual plot.

Then we performed the analysis using a multivariate logistic regression model that found that Instagram® was a significant predictor of a BSMAS score higher than the defined cut-off of 12 (OR 2.56; *p* = 0.008; CI 1.28 - 5.12).

DISCUSSION

The aim of our study was to investigate if the addiction risk differs according to the SM platform. We found that Instagram® was a significant predictor of higher BSMAS scores, suggesting a greater addictive risk even after controlling for age and sex.

Facebook® was the most accessed SM in our study, which is in line with the literature on the subject.[2] Nonetheless, regarding the differential addictive potential between different platforms, Instagram® users showed the highest BSMAS scores.

Instagram® is a platform specially designed for smartphones,[17] that is devoted to posting and sharing photographs, with more than 1 billion users worldwide.[22] Its association with higher BSMAS scores might be explained by different reasons. The fact that Instagram® is a visual SM is probably the most important factor. Since its users can easily edit photos and videos, receive comments, and 'likes', broadcast live streams, follow other profiles, and be followed by others, this multiplicity of actions seems to

Table 2 – Results from the multivariate model

Age categories, n (%)	Coefficients (*B*)	*p*-value
25 - 34 years	-0.24	0.78
35 - 44 years	-0.49	0.71
> 45 years	-2.29	0.05
Males, n (%)	0.96	0.07
Social media networks, types		
Uses Facebook®	-0.31	0.97
Uses Instagram®	2.51	0.00
Uses Pinterest®	-0.15	0.79
Uses Twitter®	1.38	0.10

contribute to its excessive use. In fact, statistics show a total of around 544 million posts daily,[23] guaranteeing that the user has always something new to watch, in a seemingly endless scroll, keeping users online longer. Moreover, the explore page algorithm shows photos and videos based on previous research, customizing the pages to show according to everyone's interests, making it easier to spend even more time on the app.

Additionally, Instagram® stories (photos or short videos available for 24 hours only), may help to explain its association with higher BSMAS scores since the user can tailor these snaps with stickers, questions, or polls to obtain reactions from followers, which may act as an immediate reward, positively reinforcing the dysfunctional behavior when it is turned into an addiction. Besides, the stories are shown continuously one after the other and they are also the first thing one sees when opening the app.

Lastly, Instagram® was specifically designed as a smartphone app, enabling its use on the go. In fact, 91% of SM users access the platforms through mobile devices,[24] and the number of smartphone users in 2020 is estimated to be 3.5 billion worldwide.[25]

The present study has some limitations. We recognize that the cross-sectional study design does not allow us to prove the directionality of our findings or demonstrate causality. Another limitation of our study is being an open access poll, leading to an imbalance in sex and age groups, However, these differences were controlled for in the multivariate models. Also, individual variables that could lead to higher addictive tendencies, such as personal or family history of addictive disorders, or personalities with a greater tendency to addiction, were not controlled in this study. The limitation of the Bergen Social Media Addiction Scale (scale used to assess addiction in the questioned social networks) not having been validated for Portuguese, which does not seem to us to be a very significant limitation, since the previous version of the scale (Bergen Facebook Addiction Scale) has been validated for European Portuguese by Pontes *et al*.[26] Additionally, the sample size is relatively modest. Nevertheless, the sample is comprised of the general population, and potentially representative of the population that has more access and use of SM.

Even though SM addiction has been reported in several studies, to the best of our knowledge, this is the first study to compare the addictive risk of different SM platforms that has a diverse sample with convenient size.

CONCLUSION

Instagram® had the highest score in the BSMAS scale, with statistical significance, which could suggest a higher addictive potential. Further studies, preferably using more representative samples and with an experimental methodology, should be conducted to understand the directionality of the findings and long-term consequences.

AUTHOR CONTRIBUTIONS

BCR: Conception of the work; methodology; fata collection; writing of the manuscript.

CC, PCP, IDS: Data collection; critical review, editing and approval of the manuscript.

FN: Conception of the work; methodology; data collection and analysis; critical review, editing and approval of the manuscript; supervision of the work.

PROTECTION OF HUMANS AND ANIMALS

The authors declare that the procedures were followed according to the regulations established by the Clinical Research and Ethics Committee and to the Helsinki Declaration of the World Medical Association updated in 2013.

DATA CONFIDENTIALITY

The authors declare having followed the protocols in use at their working center regarding patients' data publication.

COMPETING INTERESTS

PCP has received support for attending meeting and/or travel from Lundbeck.

FN has received payment or honoraria for lectures, presentations, speakers, bureaus, manuscript writing or educational events from Tecnifar and Lundbeck; received support for attending meetings and/or travel from Angelini.

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