

Prevalence of internet addiction and its association to impulsivity, aggression, depression, and anxiety in young adult university students

Prevalências de dependência de internet e sua associação à impulsividade, agressividade, depressão e ansiedade em jovens universitários

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Abstract

The increasing availability of the Internet, although with many positive effects for most, has triggered addictive effects for part of the population. They experience social isolation due to Internet overuse and, when deprived of it, they feel anxiety, fissure, and psychomotor agitation. This study investigated associations among Internet addiction, demographic and cognitive variables, such as impulsivity, aggression, and depressive and/or anxiety symptoms. In this study, 1,485 young adults (67.9% women) were assessed using four psychological instruments. It was found that 19.1% of the participants presented a moderate or severe internet addiction, with men having a higher prevalence (45.0%). The risk population also included individuals who use the Internet for gaming and residents of the Northeastern region of Brazil. Moreover, a higher index of motor or attentional impulsivity, or more depressive symptoms, seems to increase the prevalence of Internet Addiction, requiring greater attention in preventive strategies.

Keywords: Addiction; Aggression; Anxiety; Depression; Impulsive behavior; Internet.

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Resumo

A crescente disponibilidade de Internet, embora traga consigo inúmeros efeitos positivos para a maior parte da população, tem desencadeado efeitos aditivos para uma parcela dela. Devido ao uso excessivo da internet, essa fração da população experiencia isolamento social e sintomas de ansiedade, fissura e agitação psicomotora quando privados de Internet. Este estudo investiga associações entre a Dependência de Internet e variáveis demográficas e cognitivas como impulsividade, agressividade e sintomas depressivos e de ansiedade. Participaram do estudo 1485 jovens adultos universitários (67,9% mulheres), avaliados por meio de escalas psicológicas. Verificou-se que 19,1% apresentaram Dependência de Internet moderada ou grave, sendo que sujeitos do sexo masculino apresentaram prevalência 45,0% superior. A população de risco é composta ainda por indivíduos que utilizaram a internet para jogos e os residentes da região Nordeste do Brasil. Além disso, participantes com maior impulsividade motora e atencional e mais sintomas depressivos têm um aumento na prevalência de Dependência de Internet, e requerem maior atenção em estratégias preventivas.

Palavras-chave: Dependência; Agressão; Ansiedade; Depressão; Comportamento impulsivo; Internet.

The way people socialize, communicate, and acquire knowledge has been revolutionized by modern information and communication technologies (Rodrigues, 2017). The emergence and establishment of the Internet in a stationary and mobile environment has allowed people to perform several novel tasks, such as attending university through distance learning, publishing texts for large audiences, and socializing with individuals from various parts of the world. In this context, there was a change in the structure of sociability and the emergence of a new communication gap (Baquero et al., 2016; Rodrigues, 2017).

Despite the great positive impact caused by the advent of the Internet, it has addictive effect on some individuals. The excessive use of this tool harms users in the physical, psychological, and social spheres, as they might feel an intense difficulty in controlling its use (Nassehi et., 2016). This addictive picture has more commonly been called Internet Addiction (IA) or Troublesome Internet Use (Vally et al., 2020). Although the abusive use of the Internet is not officially recognized as a disorder by the medical community, symptoms of this problem have been described by professionals from different areas (Ebert et al., 2015; Ko et al., 2012; Kuss et al., 2014).

A growing phenomenon, IA is characterized by a constant and prolonged pattern of: 1) Long hours online despite the physical and mental damage caused; and 2) when deprived of internet use, the individual experiences symptoms of anxiety, fissure, psychomotor agitation (Schimmenti et al., 2017). In addition to these losses, the overuse of the Internet generates social isolation since it makes the subjects experience less face-to-face activities and seek satisfaction in a virtual environment (Liu et al., 2016).

Internet addiction in university students

Stress with social interactions and study routine, common in young adult university students, can lead to a greater tendency to overuse the Internet as a way of temporary relief from everyday stressors (Al-Gamal et al., 2016; Poynton & Lapan, 2017). University students are the predominant users of the Internet, using it as the main tool for educational purposes and recreational activities. Flexible schedules and easy access also contribute to overuse of Internet in this population (Amin, & Kaur, 2015).

Studies conducted in different countries show that between 8.6 and 40% of university students have some degree of IA (Al-Gamal et al., 2016; Alaçam et al., 2015; Servidio, 2014). A Brazilian study conducted by Marin et al. (2016) with a sample of 301 university students, found that 7.3% of them were classified as internet addicts. Some of the harmful effects of the overuse of the Internet in this population are sleep deprivation, worse academic performance, negative affective states, and decreased ability to concentrate (Li et al., 2015).

Internet addiction and impulsiveness

Some individual characteristics are associated with Internet Addiction, among which, a diminished inhibitory control (Brand et al., 2014). The impulsiveness resulting from this decrease is considered an unique component of neuropsychological functioning, and can be defined as a predisposition for rapid and unplanned reactions to internal or external stimuli without taking into account the negative consequences of these reactions both for the subject who emits them and the others (International Society for Research on Impulsivity, 2020). Individuals with Internet Addiction have greater impulsiveness and less inhibitory control than non-addicted individuals (Brand et al., 2014; Dieter et al., 2017). The decrease in inhibitory response may be a factor that contributes to the maintenance and worsening of addictive behaviors in relation to the Internet (Dieter et al., 2017). In this sense, Lee et al. (2012) concludes that IA can be considered an impulse control disorder, with reduced prefrontal processing in subjects with Internet addiction, which may be related to the lack of control in the use of this tool (Brand et al., 2014).

Internet addiction and aggressiveness

Aggressiveness consists of several phenomena that differ in relation to neural control mechanisms, having different manifestations and functions activated from internal or external circumstances (e.g. anger and impulsivity are components of aggressive behavior) (Ramirez & Andreu, 2006). Unfavorable situational factors (e.g. exposure to violence, negative vital events, and less social support) are often experienced by Internet addicts, which facilitates the presence of aggressive behavior in these subjects (Fengqiang et al., 2016; Lim et al., 2015). Thus, aggressiveness is also found as a characteristic of subjects with IA symptoms.

In addition to the possibility of anonymousness of the online environment providing a decrease in user accountability, online activities provide excitement and sensory overload, contributing to aggressive behavior during their use (Hwang et al., 2014). This characteristic is not only related to the presence of symptoms, but also mediated by the low self-control of individuals who have Internet Addiction (Hahn & Kim, 2014; Lim et al., 2015).

Internet addiction, depressive symptoms, and anxiety

Depressive symptoms are also associated with the presence of Internet addiction and maintenance of symptoms of this pathology (Dalbudak & Evren, 2014; Chang et al., 2015; Liang et al., 2016; Ostovar et al., 2016). In these cases, the Internet serves as a psychologically compensating function for the depressed individual, as it provides temporary relief from symptoms by bringing the user closer to alternative realities (Lai et al., 2015). Additionally, depression has a moderating effect in the sense of reducing coping strategies for the subject to deal with his or her addiction (Chou et al., 2015). Subjects with anxiety are also more vulnerable to Internet addiction, which aggravates the symptoms of this pathology (Ostovar et al., 2016; Taymur et al., 2016; Weinstein et al., 2015).

Given the above, and the scarcity of data on the topic in the Brazilian context, in addition to the high rate of use of digital media in this population (We Are Social & Hootsuite, 2018), this study aimed to obtain further clarification on this phenomenon and some associated factors. To this end, an investigation was conducted on the prevalence and association between Internet addiction and demographic (sex and region) and psychological (impulsivity, aggressiveness, anxiety, and depressive symptoms) variables.

Methods

A cross-sectional study was developed in which the target population was undergraduate students aged 18 to 24, selected by convenience. The project was approved by the ethics committee of the Universidade Federal do Rio Grande do Sul (UFRGS, Federal University of Rio Grande do Sul), *Certificado de Apresentação para Apreciação Ética* (CAAE, Presentation Certificate for Ethical Appreciation) protocol nº 68801517.5.0000.5334. After that, the instruments used were inserted in an online platform. The students were invited to participate in the study through advertisements in social networks or by e-mail. Data collection was performed through an online format and lasted around 30 minutes. The first step was an explanation of the study through a text in which the subjects were informed about the objectives and procedures to be used, as well as instruments to be filled out. Then, the subject was invited to sign the Informed Consent Form (ICF). After signing it, the individual was automatically directed to the next steps, consisting of the sociodemographic questionnaire and the following instruments:

Internet Addiction Test (IAT)

To assess the addiction and/or excessive use of Internet in the sample, the Internet Addiction Test (IAT) (Widyanto & McMurrin, 2004) was used in a version adapted to the Brazilian population, by Conti et al. (2012). This is a self-administered instrument composed of 20 questions such as: "2. How often do you abandon household chores to spend more time on the internet?" and "15. How often do you feel worried about the internet when you are disconnected, imagining that you could be connected?". Answers were given in a five-point Likert scale, ranging from Rarely = 1 to Always = 5. The higher the score, the greater the severity of addiction, which could vary from 0 to 100 points and the results categorized into: none (0-30 points); mild (31-49 points); moderate (50-79); and severe (80-100). The Cronbach's alpha coefficient found in the analyzes of the present study was 0.89.

Barratt Impulsiveness Scale (BIS-11)

In order to assess the level of impulsiveness of the participants, it was used the Barratt Impulsiveness Scale 11 (BIS-11) (Patton et al., 1995), adapted for the Brazilian population by Malloy-Diniz et al. (2010). The Scale consists of 30 statements aiming to assess impulsivity in general and in three subtypes of behavior: Motor Impulsivity, "19. I act in the 'heat' of the moment."; Attentional Intensity, "15. I have thoughts that overlap one another."; and Lack of Planning, "27. I am more interested in the present than in the future.". These are answered using a four-point Likert scale ranging from Rarely or never = 1 to Always or almost always = 4. The analysis of answers to this scale occurs with scores between 30 and 120 points, the highest being suggestive of a higher impulsivity. The Cronbach's alpha coefficient found in the analyzes of the present study was 0.82.

Buss-Perry Aggression Questionnaire (BPAq)

In order to assess the aggressiveness in the sample, the Buss-Perry Aggression Questionnaire (BPAq) (Buss & Perry, 1992) was used, in a version adapted for the Brazilian population by Gouveia et al. (2008). This instrument addresses aggression in a multifactorial way through 26 statements and gathers, in addition to the general score, four factors that allow estimating how aggression is manifested: Physical Aggression, "1. If someone hits me, I hit back."; Verbal Aggression, "26. I cannot stay silent when people disagree with me."; Anger, "17. I have difficulty controlling my temper."; and Hostility, "7. I am suspicious of strangers who are friendly to me.". The answers are given from a 5-point Likert scale, where the subject scores according

to the degree of agreement regarding each statement, being Strongly Disagree = 1 and Strongly Agree = 5. The Cronbach's alpha coefficient found in the analyzes of the present study was 0.89.

Depression Anxiety and Stress Scale (DASS-21)

To measure depression, anxiety, and stress in the sample, the Depression Anxiety and Stress Scale 21 (DASS-21) (Lovibond & Lovibond, 1995) was used, in a version adapted for the Brazilian population by Vinigola & Tucci (2014). The DASS-21 (reduced version of the DASS, which contains 42 questions) consists of 21 items in which the individual answers questions related to three emotional states over the past week: Depression, "16. I could not get excited about anything "; Anxiety, "20. I was afraid for no reason "; and Stress, "14. I felt that I was a little too emotional / sensitive ". The participant responds according to a Likert scale that varies between Not applicable at all = 0, and Very much applicable, or most of the time = 3. The Cronbach's alpha coefficient found in the analyzes of the present study was 0.95.

Data Analysis

For quantitative analysis, descriptive and comparative statistical procedures were used through the Statistical Package for the Social Sciences (SPSS) software, version 21.0. The level of significance adopted was 5% ($p < 0.05$). Initially, the subjects were divided into two groups, Group 1 (non-internet addicts), and Group 2 (internet addicts). Group 1 included individuals with scores between 0 and 49, corresponding to the "no addiction" and "mild addiction" categories at the IAT. Group 2, on the other hand, was composed of subjects who had scores from 50 to 100, corresponding to the "moderate addiction" and "severe addiction" categories.

Quantitative variables were described as mean and standard deviation or median and interquartile range, depending on data distribution. Categorical variables were described by absolute and relative frequencies. Pearson's chi-square test was applied to assess the association between categorical variables. The adjusted residuals test was used to locate the differences found in the aforementioned test when necessary. To perform the comparison of means, the Student t test was applied but, in case of asymmetry, the Mann-Whitney test was used.

For the control of confounding variables, Poisson Regression analysis was applied. The criterion for the variable entrance into this multivariate model was that it should have a $p < 0.20$ in the bivariate analysis and, for permanence in the final model, a $p < 0.10$.

Results

The sample consisted of 1,485 young adults with an average age of 21.1 years (± 1.8), predominantly female (67.9%), from all regions of the country, with greater access to the internet at home (48.1%) and smartphone (48.8%). More than half of the sample (57.9%) uses the internet for more than 6 hours a day, mainly for social networks (76.9%). When assessing the degree of Internet Addiction, 18.3% had a moderate degree and 0.8% a severe degree of addiction, meaning that almost 20.0% of young adults had some significant degree of addiction on the Internet (Table 1).

Analyzing the associations between the studied variables, for isolation, and the degree of Internet Addiction (None / Mild Addiction or Moderate / Severe Addiction), we noticed that there are correlations in

Table 1*Sample characterization*

Variables	N = 1,485	
	n	(%)
Age (years old)	<i>Mean 21.1 ± SD 1.8</i>	
Sex		
Female	1.009	(67.9)
Male	476	(32.1)
Region		
Northern	64	(4.3)
Northeastern	448	(30.2)
Mid-western	14	(0.9)
Southeastern	521	(35.1)
Southern	436	(29.4)
Area of study		
Engineering	333	(22.4)
Applied Social Sciences	302	(20.4)
Health Sciences	273	(18.4)
Humanities	208	(14)
Linguistics, Letters, and Arts	90	(6.1)
Exact and Earth Sciences	85	(5.7)
Others (Biological, Agrarian Sciences and others)	187	(12.6)
Where do you use the internet from most often?		
Home	714	(48.1)
Friend's home	3	(0.2)
Smartphone	724	(48.8)
University	41	(2.8)
Lan House	3	(0.2)
How many hours a day do you use the internet?		
< 2h	16	(1.1)
From 2 to 4h	212	(14.3)
From 4 to 6h	397	(26.7)
> 6h	860	(57.9)
Which of the activities below do you do most on the internet?		
Answer e-mails	19	(1.3)
Play games	57	(3.8)
Work- or study-related tasks or essays	185	(12.5)
Use social networks	1.142	(76.9)
Browse websites	82	(5.5)
Internet addiction		
None	490	(33.0)
Mild	711	(47.9)
Moderate	272	(18.3)
Severe	12	(0.8)

most of the questions, excluding age and place of internet access (Age: $p = 2.5$; Location: $p = 0.281$) (Table 2). We identified that young males had moderate or severe addiction more frequently than females ($p = 0.02$), as well as residents of the northeastern region of the country also present a greater association with moderate or severe levels IA levels ($p = 0.012$). Even more significantly, the kinds of activities carried out online seem to have a significant impact on the degree of IA, and those who use the internet for gaming are the ones that develop such addiction the most ($p > 0.001$). When analyzed in isolation, the impulsivity, stress, anxiety, depression, and aggressiveness cognitive variables also presented a positive association with the IA severity (all: $p > 0.001$).

Table 2*Associations between the variables and Internet addiction*

Variables	None/Mild addiction	Moderate/Severe addiction	<i>p</i>
	<i>N</i> = 1,201 <i>n</i> (%)	<i>N</i> = 284 <i>n</i> (%)	
Age (years old) – mean ± <i>SD</i>	21.1 ± 1.9	20.9 ± 1.8	0.250
Sex – female	833 (69.4)	176 (62.0)	0.020
Region			0.012
Northern	57 (4.8)	7 (2.5)	
Northeastern	340 (28.4)	108 (38.0)*	
Mid-western	12 (1.0)	2 (0.7)	
Southeastern	424 (35.4)	97 (34.2)	
Southern	366 (30.5)*	70 (24.6)	
Where do you use the internet from most often (n%)?			0.281
Home	581 (48.4)	133 (46.8)	
Friend's home	1 (0.1)	2 (0.7)	
Smartphone	583 (48.5)	141 (49.6)	
University	34 (2.8)	7 (2.5)	
Lan House	2 (0.2)	1 (0.4)	
How many hours a day do you use the internet (n%)?			< 0.001
< 2h	15 (1.2)	1 (0.4)	
From 2 to 4h	193 (16.1)*	19 (6.7)	
From 4 to 6h	352 (29.3)*	45 (15.8)	
> 6h	641 (53.4)	219 (77.1)*	
Which of the activities below do you do most on the internet (n%)?			< 0.001
Answer e-mails	17 (1.4)	2 (0.7)	
Play games	37 (3.1)	20 (7.0)*	
Work- or study-related tasks or essays	166 (13.8)*	19 (6.7)	
Use social networks	913 (76)	229 (80.6)	
Sites	68 (5.7)	14 (4.9)	
Barratt – mean ± <i>SD</i>			
Attentional Impulsivity	17.1 ± 3.9	20.7 ± 4.0	< 0.001
Motor Impulsivity	18.4 ± 3.6	21.7 ± 4.9	< 0.001
Lack of planning	21.5 ± 4.0	24.3 ± 5.0	< 0.001
Total	57.0 ± 8.9	66.7 ± 10.9	< 0.001
DASS – Stress – mean (P25 – P75)	7 (5 – 11)	12 (8 – 16)	< 0.001
DASS – Anxiety – mean (P25 – P75)	5 (2 – 9)	10 (5 – 15)	< 0.001
DASS – Depression – mean(P25 – P75)	7 (3 – 11)	14 (8 – 18)	< 0.001
BPAq – Aggressiveness – mean ± <i>SD</i>			
Physical aggression	14.2 ± 4.9	16.5 ± 6.3	< 0.001
Verbal aggression	11.5 ± 3.7	13.0 ± 4.1	< 0.001
Anger-Aggressiveness	16.1 ± 6.1	19.5 ± 5.9	< 0.001
Hostility-Aggressiveness	24.9 ± 6.3	28.5 ± 6.6	< 0.001
Total	66.6 ± 16.5	77.5 ± 18.4	< 0.001

Note: *Statistically significant association by the residual test adjusted to 5% of significance. BPAq: Buss-Perry Aggression Questionnaire; DASS: Depression, Anxiety and Stress Scale.

To control confounding factors, the variables were inserted into a multivariate model (Table 3). After adjustment, the following variables were associated with a greater degree of Internet Addiction: sex, region, hours of Internet use per day, attentional and motor impulsiveness, and depressive symptoms. Young males showed a 45% higher prevalence of moderate/severe Internet Addiction when compared to young females. Subjects from the Northeastern region had a 110% higher probability of moderate / severe Internet Addiction, when compared to those from the Northern region.

Table 3*Multivariate Poisson Regression Analysis to assess factors associated with moderate/severe internet addiction*

Variables	Ratio of prevalence (CI 95%)	<i>p</i>
Sex – Male	1.45 (1.18 – 1.77)	< 0.001
Region		
Northern	1.00	
Northeastern	2.10 (1.07 – 4.12)	0.030
Mid-western	0.84 (0.20 – 3.50)	0.812
Southeastern	1.59 (0.80 – 3.14)	0.185
Southern	1.63 (0.81 – 3.25)	0.169
How many hours a day do you use the internet?		
< 4h	1.00	
From 4 to 6h	1.11 (0.71 – 1.75)	0.644
> 6h	1.96 (1.30 – 2.93)	0.001
Uses the internet more for games	1.61 (1.09 – 2.37)	0.017
Barratt		
Attentional Impulsivity	1.07 (1.04 – 1.09)	< 0.001
Motor Impulsivity	1.06 (1.04 – 1.09)	< 0.001
DASS – Depression	1.05 (1.02 – 1.07)	< 0.001

Young adults who use the internet for more than 6 hours have their prevalence of moderate / severe Internet Addiction increased by 96% when compared to those who use the internet for less than 4 hours per day. Individuals whose main use of the internet is for games have a 61% higher prevalence of moderate / severe Internet Addiction when compared to those who use the internet for other reasons. Finally, to every additional point on the scales of attentional, motor and depression impulsivity, the prevalence of moderate / severe Internet Addiction increases by 7%, 6%, and 5%, respectively.

Discussion

This study aimed to investigate the association between Internet addiction and the variables: sex, age, region, impulsivity, aggressiveness, anxiety symptoms, and depressive symptoms. The data obtained with this study, mostly, agreed with what has been shown in the literature in relation to studies with similar methodology.

Moderate and severe Internet Addiction symptoms were seen in 19.1% of young adults, a prevalence close to the one that was found in a similar cross-sectional study by Dalbudak and Evren (2014) conducted in Turkey with 271 students, when it was found that 19.9% of university students had scores corresponding to some degree of IA. A systematic review that aimed to analyze 68 epidemiological studies on Internet Addiction found the lowest prevalence in Italy (0.8%) and the highest prevalence in Hong Kong (26.7%) (Kuss et al., 2014). More recently, a Canadian study carried out with 86 university students, aged between 18 and 30 years, showed a much higher IA prevalence than the prevalence found in the present study, with 64% of individuals with moderate and 16% with severe IA levels (Lyvers et al., 2016).

Once again, according to the literature (Kuss et al., 2014; Marazziti et al., 2016), a higher IA prevalence was found in males (45% higher). Even so, this is not a consensus. Truzoli et al. (2016), in a study also carried out with university students, found no significant difference between sexes regarding IA; and, in Brazil, a study carried out with adolescents between 12 and 18 years old also found no differences between sexes regarding IA (Terroso & Argimon, 2016).

Northeastern region young adults led the list divided by Brazilian regions for the prevalence of moderate and severe IA symptoms. Although this datum is new to the literature, they may be related to the rapid

increase in Internet availability in the region as new access technologies emerge and actions aiming to reduce the digital inequality are promoted (Felizola et al., 2017). Other explanations, such as a possible association with the incidence of depressive, anxious, or impulsive symptoms in this region were not confirmed by the data found in the present study.

Using the internet for gaming purposes was related to a significantly higher IA prevalence, which may be related to the presence of depressive symptoms in those who have this activity as predominant, since they end up staying online for longer periods, which also contributes to a greater chance of IA symptoms (Van Rooij et al., 2017; Terroso & Argimon, 2016). Besides, online games contain important aspects related to social interaction, which contributes for longer periods online when to subjects choose this type of activity (Schou Andreassen et al., 2016; Kardefelt-Winther, 2014). According to Wallace (2014), online games are an important issue in the context of Internet addiction, the author reports that online games are the cause of IA for most boys who have some degree of this disorder.

Contrary to what was presented in the study by Hwang et al. (2014), aggressiveness was shown only as a factor in an isolated analysis, not being maintained as a factor for IA in the regression model performed. However, in relation to impulsivity, in the “motor impulsivity” and “attentional impulsivity” subscales, it was noticeable that higher scores increase IA prevalence. Impulsivity is associated with a preference for immediate reinforcers as well as an inability to inhibit behaviors, factors associated with IA (Truzoli et al., 2016). In addition to IA, impulsivity is also related to other addictive behaviors such as pathological gambling and drug addiction (Chaim et al., 2015; Giotakos et al., 2017). Prolonged exposure to activities in which answers are immediate and predominantly controlled by the individual, such as online games, can facilitate the development of impulsive behaviors (Wanner et al., 2009). In this sense, other studies also emphasize the role of impulsivity as a risk factor and a maintainer of IA (Cao et al., 2007; Dalbudak et al., 2013; Yoo et al., 2004).

Furthermore, it was observed that depressive symptoms contribute to the increase in the prevalence of IA in the sample. Other studies carried out also with university students, consider this type of symptom as a factor associated with IA (Demir & Kutlu, 2016; Ko, et al., 2012), indicating that depression is a predictor of IA (Dalbudak & Evren, 2014). Some authors report that depressive symptoms can be generated by the excessive use of the internet, among the reasons being the frustration generated by the difficulty in controlling the use and the losses in social and professional spheres (Ding et al., 2016). Thus, a bidirectional relationship is found about the relationship between IA and depressive symptoms.

In contrast, Kardefelt-Winther (2014), suggest a compensatory model for IA. The author indicate that university students use the internet to relieve stress and other negative emotions. Thus, since the use is preceded by psychosocial problems, the risk for it to become excessive increases. In the same direction, the study by Terres-Trindade and Mosmann (2016), identified family variables such as conflicts between parents and children and the perception of interparental conflict when predicting IA in young adult Brazilians. A systematic review also found that conflicting family relationships can predict IA in young adult Chinese (Li et al., 2014).

Closing remarks

The present study clarified that being male, using the internet predominantly for online games, the presence of depressive symptoms and impulsivity are factors associated with Internet addiction among university students. These data are in accordance with the premise that negative emotions contribute to the development and maintenance of addictive disorders. And that, as in drug addicts, the lack of self-control present in impulsive subjects makes it difficult to control its use, facilitating the presence of IA. A hypothesis for the finding that more impulsive and / or depressive subjects have a higher prevalence of Internet Addiction,

is the presence of immediate reinforcers in online activities. Therefore, it should be noted that male university students and more impulsive and/or depressed subjects, require greater attention in preventive strategies regarding IA.

As limitations of this article, it should be noted that the cross-sectional design does not allow establishing a causal relationship between the variables. Thus, through this study, it is not possible to infer whether impulsivity, as well as depressive and anxiety symptoms, are causing or maintaining IA symptoms. Moreover, the online data collection methodology may have favored skewed recruitment of participants with IA features, in addition to not being able to ensure appropriate conditions for the participants to complete the scales.

We suggest that future studies use a longitudinal and face-to-face design to better define which individual characteristics predispose individuals to IA. Also, specific studies on the impact of each of the variables studied (impulsivity, aggression, stress, and depression) on the predisposition of individuals to IA are required to accurately define the cognitive and functional dynamics of internet addicts. Studies investigating the characteristics that caused Northeastern participants to have higher IA scores are also suggested as a way to understand the social and cultural impacts on the development of this disorder in this population.

Contributors

The present study was conceptualized and developed by L. B. TERROSO and Rosa M. M. de ALMEIDA. These authors were also involved in the analytical phases, scientific writing, and in the approval of the final version of this article. M. PANTE and J. S. KRIMBERG were responsible for data interpretation, scientific writing and its reviews, and the approval of the final version of this article.

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