Prevalence of internet addiction and associated factors in students

Prevalência de adicção em internet e fatores associados em estudantes

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Abstract

Objective
A cross-sectional study that estimated the prevalence of Internet Addiction and associated factors among High School and College students in Montes Claros – Minas Gerais, Brazil.

Methods
Internet Addiction was evaluated through the Internet Addiction Test, and demographic, socioeconomic, and lifestyle factors, as well as internet usage profile characteristics, were examined. Descriptive analysis and the Poisson regression model were applied.

Results
Of the 2,519 participants, 52.3% were considered with Internet Addiction Problems. In High School, the following factors were identified: are women and girls, age over >16, class C, alcohol consumption, impaired sleep, frequent use of social networks, and time spent connected. In Higher Education, the following factors: are women and girls, age over >23, paid activity, class C and D/E, alcohol consumption, impaired sleep, imbalanced diet, frequent use of social networks, and time spent connected.

Conclusion
There was an expressive prevalence of Internet Addiction Problems, an outcome associated with the demographic, socioeconomic, lifestyle, and internet use characteristics.

Keywords: Behavior, addictive; Epidemiologic studies; Internet; Student health.

Resumo

Objetivo

Estudo transversal que estimou prevalência de Adicção em Internet e fatores associados entre estudantes do Ensino Médio e Superior em Montes Claros – Minas Gerais, Brasil.

Métodos

A Adicção em Internet foi avaliada pelo Internet Addiction Test e se investigaram fatores demográficos, socioeconômicos, estilo de vida e perfil de uso de internet. Foram realizadas análises descritivas e modelo de regressão de Poisson.

Resultados

Dos 2.519 participantes, 52,3% apresentaram problemas de Adicção em Internet. No grupo de estudantes de Ensino Médio examinado, identificaram-se os seguintes fatores: sexo feminino, idade >16, classe C, consumo de álcool, sono prejudicado, uso frequente das redes sociais e tempo de conexão. No Ensino Superior, foram constatados: sexo feminino, idade >23, atividade remunerada, classe C e D/E, consumo de álcool, sono prejudicado, alimentação não balanceada, uso frequente das redes sociais e tempo de conexão.

Conclusão

Houve expressiva prevalência de Problemas com Adicção em Internet, desfecho associado a características demográficas, socioeconômicas, ao estilo de vida e ao uso da internet.

Palavras-chave: *Comportamento aditivo; Estudos epidemiológicos; Internet; Saúde do estudante.*

The internet has become popular globally, and its use has diversified (Lemos et al., 2016) in the last decade (Anderson et al., 2017). Its exponential use increase can be explained by the greater number of devices with access to the internet, availability of connection, and lower costs, with a multiplicity of services accessed (Lemos et al., 2016). The growth in internet use has occurred in different age groups, but it is more pronounced among adolescents and young adults (Terres-Trindade & Mosmann, 2016). Needs for social affirmation (Barreto, 2014), use for academic work (Pontes et al., 2015), and interest in games (Riedl et al., 2016) have contributed to the Internet becoming a habit of life for individuals at this stage (Ferreira et al., 2017).

The internet has numerous benefits, which have been accompanied by inappropriate and excessive use and the possibility of developing a dependency disorder called Internet Addiction (IA) (Ferreira et al., 2017). The IA has been considered an epidemic of the 21st century (Hinić, 2011) and represents a global problem in public health (Lee et al., 2013). Individuals with IA may lose interest in social issues external to the online environment, perform activities essentially with the use of this resource, keep their attention focused on the permanent connection, and present mood disorders when trying to decrease the time connected (Tang et al., 2017; Young, 1998).

Adolescents and young adults are considered more vulnerable to IA, as evidenced in international (Cerutti et al., 2016; Lee et al., 2015) and national studies (Terroso & Argimon, 2016; Tumeleiro et al., 2018). In students, the prevalence of IA ranged from 0.7% (Goel et al., 2013) to 35.5% (Bhandari et al., 2017) in the international scenario and from 7.3% (Marin et al., 2016) to 20.7% (Terroso & Argimon, 2016) domestically.

The IA is related to the individual's social commitment – loneliness and less interaction with family and friends (Terres-Trindade & Mosmann, 2016) – and to the impairment of physical and mental health – back pain, eye strain, sleep disorders (Khoury et al., 2017), repetitive strain injury (Greenfeld & Sutker, 1999), restlessness, irritation, dissatisfaction with life, low self-esteem, sadness (Terres-Trindade & Mosmann, 2016), anxiety and depression (Seyrek et al., 2017), high levels of stress (Ostovar et al., 2016), and neurological changes (Lin et al., 2014). In school life, IA can contribute to

lower student performance and productivity (Khoury et al., 2017), absenteeism, repetitions, and school dropout (Li et al., 2014).

In this context, tracking the condition may subsidize the elaboration of educational strategies that minimize the problems that affect the school performance, health, and well-being of students. The present study aimed to estimate the prevalence of IA and associated factors in a student population in northern Minas Gerais – Brazil.

Methods

Participants

This is an epidemiological, cross-sectional, quantitative, and analytical study whose population consisted of High School and university students enrolled in public and private institutions in the urban area of Montes Claros, in the northern portion of the Minas Gerais state, Brazil. According to the school censuses in 2012 and 2014, there were 16,216 High School students and 25,883 Higher Education students in the municipality.

To define the sample size, the following parameters were considered: an estimated prevalence of IA of 13% (Yayan et al., 2017), a confidence level of 95%, and a margin of error of 2%. The correction for the design effect was made by adopting deff = 2.0, and to compensate for possible losses, an increase of 15% was established. The minimum size of 2,500 students was estimated, which after stratification by the level of education, resulted in a minimum size of 963 in High School and 1,537 in Higher Education.

The sample selection was of the probabilistic type by conglomerates in a single stage for High School and three stages for Higher Education. In the first stage, by Probability Proportional to Size (PPS), educational institutions (five from High School and four from Higher Education) were drawn. In High School, all classes of the institutions selected were called. In Higher Education, in the second stage, courses stratified by area were drawn by PPS, and in the third stage, by Simple Random Sampling, classes were drawn by course. At both levels of education, all students in the selected classes were invited to participate in the study. Being a student regularly enrolled in the selected institutions was used as an inclusion criterion and the student's absence on the day scheduled for data collection as an exclusion criterion.

Instruments

The IA was assessed using the Internet Addiction Test (IAT) instrument in a version translated into Portuguese (Conti et al., 2012). Based on self-report, the IAT consists of 20 items with responses distributed on a five-point Likert scale, with a total score ranging from 20 to 100 points, obtained from the sum of the answers of its items. According to the score obtained, the students were classified into the following categories: average user, who has complete control over the use of the internet (20 to 39 points); problematic user, who has occasional problems due to the use of the internet (40 to 69 points); and user with IA, who has significant problems because of the use of the internet (70 to 100 points) (Young, 1998).

A self-administered questionnaire that included demographic (gender and age), socioeconomic (study shift, type of institution, professional activity, and economic class) characteristics, lifestyle (physical activity practice, balanced diet, smoking, alcoholism, leisure, and sleep), and internet usage profile (shift of use, purpose and time of daily use), was also used.

Regarding demographic and socioeconomic characteristics, the age variable was investigated by self-report in years and categorized as below or above average. The study shift was grouped into daytime, which corresponded to the morning, afternoon, and full-time shifts, and night shifts. The type of educational institution was classified as public or private. The performance of extracurricular work was investigated, defined as the exercise of paid activity, and categorized as yes or no. The economic class was defined by the *Associação Brasileira das Empresas de Pesquisas* (Brazilian Economic Classification Criterion of the Brazilian Association of Research Companies) and grouped into: A; B; C; D/E (Associação Brasileira de Empresas de Pesquisa, 2008).

To investigate the variables related to lifestyle – physical activity, consumption of balanced food, smoking, alcohol, leisure, and sleep –, the validated instrument "Fantastic Lifestyle" was used, which considers individuals' behaviors in the last 30 days (Añez et al., 2008). This instrument consists of 20 questions, with a Likert-type frequency scale that ranges from zero to four points. In the present research, only the questions of interest that encompassed the aspects of the variables mentioned above were used.

The practice of physical activity was investigated by the weekly frequency of vigorous activities (running, cycling, etc.) for at least 30 minutes a day, and the responses were categorized as adequate (three or more times a week) and insufficient (less than three times a week). The consumption of balanced food (according to the instructions provided in the instrument on the minimum and the maximum number of portions of each food group consumed per day) was assessed by the frequency of their ingestion. This frequency was categorized as: insufficient (almost never/rarely/sometimes) and adequate (relatively often/almost always). Tobacco consumption referred to its current use, and the answers were grouped as no (does not consume/has not consumed in the last 12 months) and yes (does consume). The investigation of alcohol consumption referred to the average intake of doses per week, which was grouped into: no (no dose) and yes (one or more doses). Leisure was investigated concerning the frequency that the person relaxes and enjoys leisure time, and the answers were categorized as: insufficient (almost never/rarely/sometimes) and adequate (relatively often/almost always). Sleep was assessed as to how often the individual sleeps well and feels rested, which was grouped into: impaired (almost never/rarely/sometimes) and preserved (relatively often/almost always).

To check the profile of internet use, the self-report on the nocturnal habit of using the internet (no and yes), the frequency of using social networks, e-mail, and the internet to perform school activities, to watch/listen to movies, songs, videos, and to play online, categorized into eventually (never/rarely/occasionally) and frequently (often/almost always/always). The average daily internet connection time, in hours, was also evaluated.

The "Internet Addiction Problems" (IAP) were considered as a dependent variable, identified from the IAT classification. The presence of IAP was considered when users were classified as problematic or addicted, and the absence of IAP when classified as average users. The other characteristics investigated were treated as independent variables.

Procedures

After authorization from the regional teaching superintendence, the responsible researcher visited the selected institutions and met with their directors to present the research. With the consent of the directors of the institutions, the selected classes were explained the research, delivered the Informed Consent Form, and the Free and Informed Consent Form (FICF), and the data collection was scheduled for the subsequent day. Data were collected between the

second semester of 2016 and the first semester of 2017 in the classroom by a multidisciplinary team and by previously trained undergraduate students.

Data Analysis

Data were entered in duplicate and processed using the SPSS® IBM® software (version 22.0). All statistical analyzes were performed separately at each level of education: High School and College, corrected by the effect of the drawing (deff). The prevalence of the three levels of Internet users was estimated, with their respective CI 95%. Subsequently, a descriptive analysis of demographic, socioeconomic, lifestyle and internet usage profiles was performed using absolute and relative frequencies. The daily time spent using the Internet was described by the arithmetic mean of the self-reported time with the 95% confidence interval (CI 95%).

Then, bivariate analyzes were performed between the outcome variable (IAP) and the independent variables, adopting the Poisson regression model with robust variance. Crude Prevalence Ratios (PR) were estimated, with their respective CI 95%. The connection time, in hours, on working days and weekends, was compared using the Mann-Whitney test since these variables did not present a normal distribution. Variables with a descriptive level (*p*-value) of up to 20% were selected for multiple analyses. In this analysis, Poisson regression was used, with the variables entered hierarchically, based on the premises of the Social Determinants of Health (Comissão Nacional sobre Determinantes Sociais da Saúde, 2008). The proposed model was constituted by blocks of variables at distal levels (demographic and socioeconomic variables), intermediate (lifestyle), and proximal (internet usage profile) (Figure 1).

Figure 1
Theoretical model proposed for the factors associated with Internet Addiction Problems in high school and university students
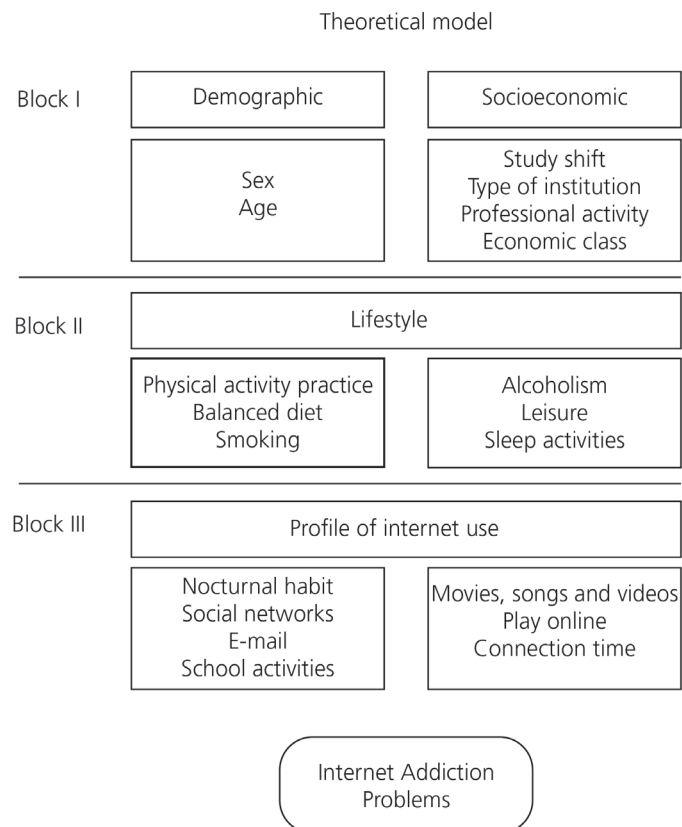
The demographic and socioeconomic characteristics block was the first to be included in the model, remaining an adjustment factor for intermediate and proximal factors. Then, the block of variables of the intermediate level (lifestyle characteristics) was included and maintained as an adjustment factor for the variables of the proximal level. Finally, the block of variables at the proximal level (internet usage profile) was included. Only those variables that presented a descriptive level $p < 0.05$ remained in the model after adjusting for the variables of the previous levels. PR adjusted with their respective CI 95% were estimated.

This study was conducted following the ethical standards of resolution nº 466 of December 12, 2012, and approved by the Research Ethics Committee under protocol nº 1,520,173/2016. The consent to carry out the research in educational institutions was signed by the Institutional Agreement, by the manager of the Regional Superintendence of Education Montes Claros, and by the director/responsible for each selected institution. Students were previously informed about the research and those of legal age or responsible for minor students who agreed to participate, signed the FICF. Those under the age of 18 signed the ICF.

Results

A total of 2,519 students participated in this research (response rate equal to 98.0%), of which 1,499 (60.5%) were female, 966 (29.6%) were in High School and 1,553 (70.4%) in Higher Education. The average age of the High School participants was 16.6 years (SD = 1.26), and Higher Education's ones was 23.5 years (SD = 5.9). Among the High School students, 42.4% were from the first year, 32.7% from the second, and 24.9% from the third. The Higher Education students were from the Biological Sciences (54.5% – Nutrition, Medicine, Speech Therapy, Nursing, Pharmacy, Psychology, and Physical Education), Exact Sciences (28.6% – Information Systems, Architecture and Urbanism, Environmental, Electrical, and Mechanical Engineering), Human Sciences (8.2% – Pedagogy, Geography, and Social Service), and Applied Social Sciences (8.8% – Administration and Economics).

On average, students used the internet for 8.7 hours on weekdays and 10.0 hours on the weekends; 85.7% habitually used the internet at night. The other demographic, socioeconomic, lifestyle characteristics and variables that describe the profile of internet use by the level of education are shown in Table 1.

Regarding the prevalence of IA, in the total sample, 6.2% CI 95%: [4.3%; 8.8%] of the students were classified as internet addicts, and 46.1% CI 95%: [42.2%; 50.0%] as problem users, totaling 52.3% CI 95%: [46.8%; 57.7%] with IAP (addicted or problem users). Figure 2 shows the prevalence of AI by the level of education, showing that the proportions of problem users and addicted users were higher among High School students, with a significant difference ($p < 0.05$).

Table 2 shows the estimates of the prevalence of IAP and the gross PR according to demographic, socioeconomic, and lifestyle variables. At both levels of education, the variables gender, age, the exercise of paid activity, economic class, balanced diet, alcoholism, leisure, and sleep showed a descriptive level of less than 20% and were selected for multiple analyses. The study shift and smoking variables were selected for the multiple models only in Higher Education.

Table 2 shows the estimates of the prevalence of IAP and gross PR, according to the profile of internet use. At both levels of education, the variables internet use at night, frequency of use of social networks, internet to watch/listen to movies, music, and videos, and play online showed a descriptive level below 20% and were selected for analysis multiple.

Table 1

Distribution of students according to demographic, socioeconomic, and lifestyle characteristics, and profile of internet use (n = 2,519)

Characteristics	Level of education					
	High School		Higher Education		Total	
	n*	%*	n*	%*	n*	%*
Demographic and socioeconomic						
Sex						
Man	450	46.6	569	36.5	1019	39.5
Woman	516	53.4	983	63.5	1499	60.5
Age**						
Below average	474	49.1	1020	65.7	1494	59.3
Above average	492	50.9	533	34.3	1025	40.7
Study shift						
Daytime	911	95.8	567	34.5	1478	52.6
Night	54	4.2	985	65.5	1039	47.4
Type of institution						
Public	819	84.8	471	30.3	1290	51.2
Private	147	15.2	1082	69.7	1229	48.8
Professional activity						
Yes	172	16.5	713	47.6	885	38.4
No	793	83.5	836	52.4	1629	61.6
Economic class						
A	151	17.9	128	8.2	279	11.0
B	365	39.2	657	43.3	1022	42.1
C	356	37.4	658	43.9	1014	42.0
D/E	53	5.5	69	4.6	122	4.9
Lifestyle						
Physical activity practice						
Adequate	425	46.6	479	30.0	904	34.3
insufficient	539	55.4	1074	70.0	1613	
Balanced diet						
Adequate	364	38.1	640	40.6	1004	39.9
Insufficient	601	61.9	913		1514	60.1
Smoking						
No	895	92.8	1381	88.9	2276	90.1
Yes	69	7.2	171	11.1	240	9.9
Alcoholism						
No	725	75.0	855	55.1	1580	61.0
Yes	235	25.0	696	44.9	931	39.0
Leisure						
Adequate	536	56.4	899	57.9	1435	57.4
Insufficient	426	43.6	653	42.1	1079	42.6
Sleep activities						
Preserved	502	51.9	748	48.6	1250	49.6
Impaired	461	48.1	804	51.4	1265	50.4
Profile of internet use						
Nocturnal habit						
No	197	20.0	184	11.9	381	14.3
Yes	768	80.0	1368	88.1	2136	85.7
Social networks						
Eventually	108	11.2	105	6.8	213	8.1
Frequently	857	88.8	1446	93.2	2303	91.9
E-mail						
Eventually	669	69.2	331	21.2	1000	35.4
Frequently	293	30.8	1222	78.8	1515	64.6
School activities						
Eventually	431	43.9	220	14.3	651	23.0
Frequently	531	56.1	1333	85.7	1864	77.0
Movies, songs and videos						
Eventually	213	21.2	458	29.3	671	26.9
Frequently	753	78.8	1094	70.7	1847	73.1
Play online						
Eventually	698	72.0	1351	86.8	2049	82.5
Frequently	264	28.0	200	13.2	464	17.5
Daily internet connection time (hours)	M	SD	M	SD	M	SD
Working days	8.6	6.3	8.7	5.4	8.7	5.8
Weekends	10.2	6.9	9.9	6.1	10.0	6.5

Note: *Values corrected by the effect of the drawing (deff), **Average (High School = 16.6 years and Higher Education = 23.5 years).

Table 2

Prevalence of Internet Addiction Problems (% IAP) and prevalence ratio in students according demographic, socioeconomic, and lifestyle characteristics, and profile of internet use (n = 2,519)
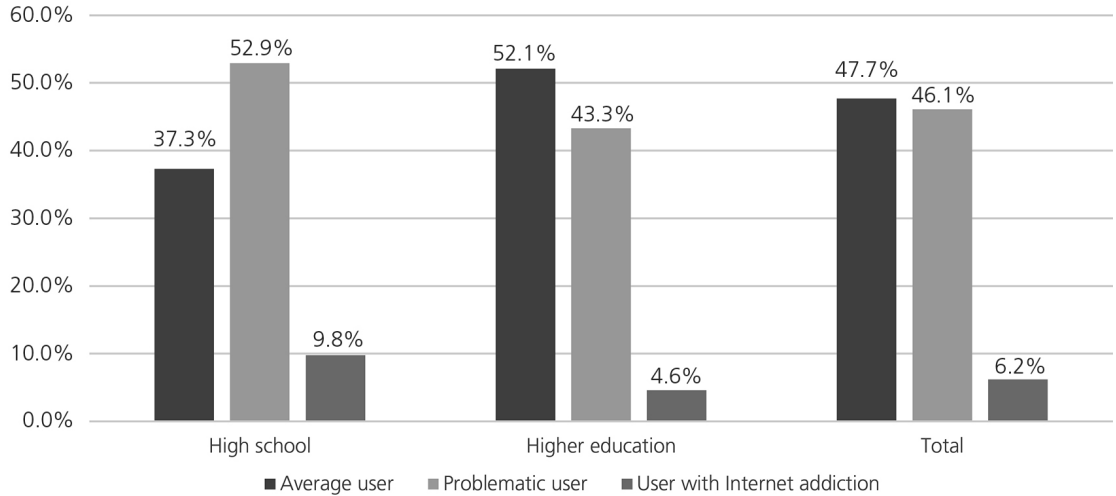
Characteristics	Level of education			
	High School		Higher Education	
	% IAP*	PR crude (95% CI)*	% IAP*	RP Crude (95% CI)*
Demographic and socioeconomic				
Sex				
Man	60.0	1.00	44.3	1.00
Woman	64.0	1.07 (0.97-1.18)	49.9	1.13 (1.01-1.26)
Age**				
Below average	66.5	1.00	53.5	1.00
Above average	57.9	0.87 (0.79-0.96)	37.1	0.69 (0.61-0.79)
Study shift				
Daytime	61.7	1.00	51.0	1.00
Night	68.5	1.11 (0.92-1.34)	46.1	0.90 (0.81-1.01)
Type of institution				
Public	61.2	1.00	47.6	1.00
Private	67.3	1.10 (0.97-1.25)	48.1	1.01 (0.90-1.13)
Professional activity				
Yes	57.0	1.00	42.4	1.00
No	63.3	1.11 (0.97-1.28)	52.6	1.24 (1.12-1.38)
Economic class				
A	74.2	1.00	57.0	1.00
B	66.8	0.90 (0.80-1.02)	48.9	0.86 (0.72-1.02)
C	52.0	0.70 (0.61-0.80)	45.9	0.81 (0.68-0.96)
D/E	66.0	0.89 (0.72-1.10)	36.2	0.64 (0.45-0.90)
Lifestyle				
Physical activity practice				
Adequate	60.9	1.00	47.2	1.00
insufficient	63.1	1.04 (0.94-1.14)	48.2	1.02 (0.91-1.15)
Balanced diet				
Adequate	56.9	1.00	40.6	1.00
Insufficient	65.2	1.15 (1.03-1.28)	53.0	1.31 (1.17-1.46)
Smoking				
No	61.9	1.00	46.7	1.00
Yes	65.2	1.05 (0.88-1.26)	57.9	1.24 (1.08-1.43)
Alcoholism				
No	57.4	1.00	42.7	1.00
Yes	76.6	1.34 (1.21-1.46)	54.3	1.27 (1.15-1.41)
Leisure				
Adequate	58.2	1.00	44.0	1.00
Insufficient	67.1	1.15 (1.05-1.27)	53.3	1.21 (1.09-1.34)
Sleep activities				
Preserved	53.8	1.00	38.8	1.00
Impaired	71.4	1.33 (1.20-1.47)	56.3	1.45 (1.30-1.62)
Profile of internet use				
Nocturnal habit				
No	38.3	1.00	23.8	1.00
Yes	68.7	1.97 (1.62-2.40)	51.2	1.56 (1.23-1.98)
Social networks				
Eventually	14.8	1.00	16.2	1.00
Frequently	68.1	4.60 (2.92-7.25)	50.3	3.10 (2.00-4.81)
E-mail				
Eventually	58.0	1.00	45.9	1.00
Frequently	71.7	1.24 (1.12-1.36)	48.4	1.06 (0.93-1.20)
School activities				
Eventually	60.1	1.00	40.5	1.00
Frequently	64.2	1.07 (0.97-1.18)	49.1	1.22 (1.03-1.44)
Movies, songs and videos				
Eventually	42.7	1.00	28.2	1.00
Frequently	67.6	1.58 (1.34-1.86)	56.2	2.00 (1.71-2.33)
Play online				
Eventually	58.2	1.00	45.0	1.00
Frequently	73.1	1.26 (1.14-1.38)	67.0	1.49 (1.33-1.67)

Note: *Values corrected by the effect of the drawing (deff), **Average (High School = 16.6 years and Higher Education = 23.5 years).
CI: Confidence Interval, IAP: Internet Addiction Problems, PR crude: Prevalence Ratio.

The frequent use of e-mail showed significant associations with the IAP at the level of 20%, only in High School, while the use of the internet to carry out school activities had that level of association only in Higher Education. The average daily internet connection time was 7.1 hours (± 4.9h) among students without IAP and 10.5 hours (± 5.4h) among students with IAP ($p < 0.001$).

Figure 2

Prevalence of Internet Addiction by the level of education (n = 2,519)

Figure 3

Adjusted model for the association between the variable Internet Addiction Problems and demographic, socioeconomic, lifestyle, and internet usage profile among High School and Higher Education students (n = 2,519)

The results of the multiple analyses are shown in Figure 3. In High School, the following variables associated with the IAP were identified after adjustment: female sex (PR = 1.12), age above the average (PR = 0.90), economic class C (PR = 0.73), alcoholism (PR = 1.33), impaired sleep
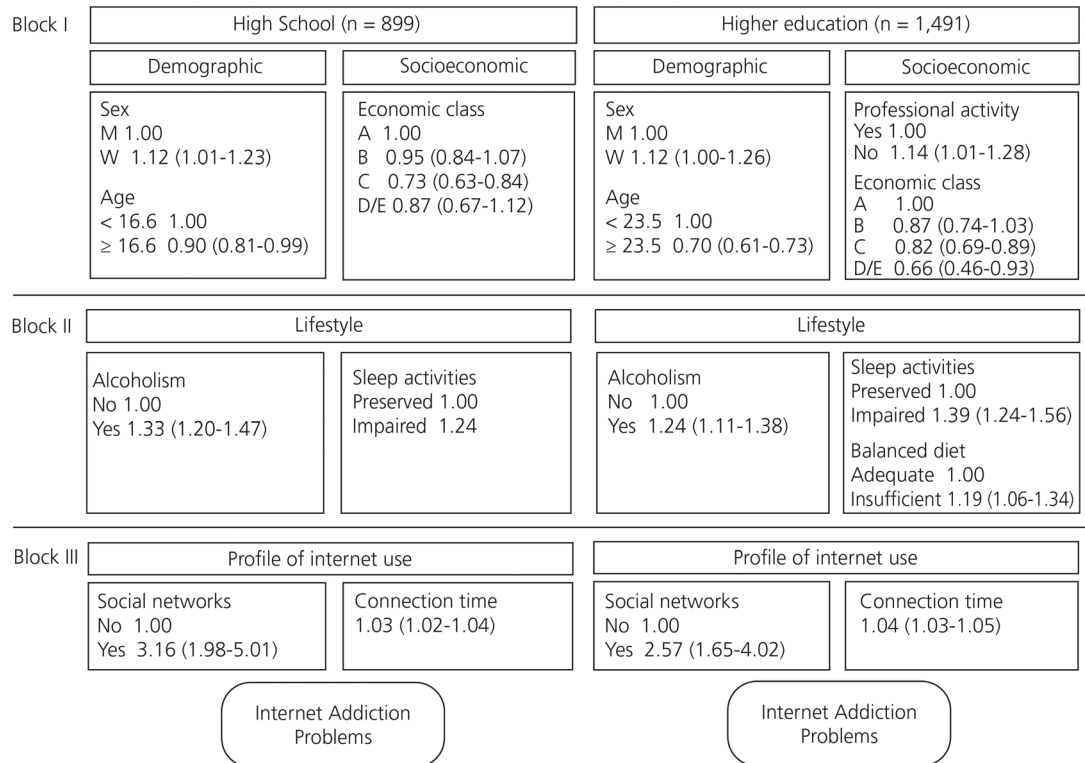
(PR = 1.24), frequent use of social networks (PR = 3.16), and the highest average daily connection time of internet in hours (PR = 1.03). In Higher Education, after adjustment, the following factors were significantly associated with the IAP: female gender (PR = 1.12), age above the average (PR = 0.70), not exercising remunerated activity (PR = 1.14), economic class C (PR = 0.82) and D/E (PR = 0.66), alcoholism (PR = 1.24), impaired sleep (PR = 1.39), insufficient balanced nutrition (PR = 1.19), frequent use of social networks (PR = 2.57) and higher average daily internet connection time in hours (PR = 1.04).

Discussion

This study found that the prevalence of IA affects about 6% of students and that more than half of those surveyed have IAP. An association of IAP was identified with sex, age, economic class, remunerated activity, consumption of alcoholic beverages, sleep, food, frequent use of social networks, and connection time. The prevalence of IA estimated in this study was higher than that found in international studies (Munno et al., 2016; Nemati & Matlabi, 2017; Seyrek et al., 2017; Wu et al., 2016), in which it ranged from 0.7% in Mumbai/India (Goel et al., 2013) to 4.0% Amsterdam/Netherlands (Vink et al., 2016). On the other hand, other international studies (Bhandari et al., 2017; Cerutti et al., 2016; Munno et al., 2016) observed higher prevalences, with estimates ranging from 8.1% in Japan (Morioka et al., 2017) to 35.4% in Chitwan and Kathmandu/Nepal (Bhandari et al., 2017). In the city of Wuhan in China, the prevalence was similar to that observed in the present study (Tang et al., 2017).

In the national scenario, different prevalences of IA were estimated: 11.0% in Macaé – Rio de Janeiro with university students (Azevedo, 2013); 7.3% among medical students in Santa Catarina (Marin et al., 2016); 8.9% among High School students from public schools in three municipalities in Santa Catarina (Tumeleiro et al., 2018), and 20.7%, in the countryside of Rio Grande do Sul with students from Elementary and High School (Terroso & Argimon, 2016). These differences in the estimates of IA prevalence can be attributed to specificities related to ethnicity, culture, social and economic factors, as well as demographic variations. The methodological criteria used to track the studied condition may vary among studies, as different instruments and cutoffs are used. In this sense, the harmonization of concepts and investigation designs is needed to enable proper comparisons between studies. The constituent groups of the studied population (undergraduate students and adolescents) possibly have different internet usage profiles. Factors associated with internet access and usage, including population income, services costs, and technology availability, may differ in several regions and countries. There may also exist discrepancies due to the period of this study and the others, given the dynamics of internet access, the evolution of devices, and the diversity of applications.

Internet use has provided several benefits and facilities for everyday life, also currently an important resource for student learning. However, when its use becomes abusive to the point of leading to a lack of control, it can become harmful to the individual and damage the family, social, student, work, and self-care relationships, leading to pathological consequences for physical and mental health. It is necessary to consider the influence of smartphones, which contributed to facilitating and increasing access to the internet at high speed and in various environments at any time of the day, especially with social networks. The possibility of connecting at all times has led to an overlapping of online and offline lives more frequently than before, which depended on the user being in front of the computer (Andrade et al., 2020, Fortim & Araujo, 2013).

The present study found that almost all users use the internet daily, with most of the time spent connecting to leisure-related activities. A study carried out with medical students found that 98.8% make daily use of the internet, of which 47.3% chose instant messaging applications as the main reason to access the internet, mainly WhatsApp (Moromizato et al., 2017). The increase in student connection time has been linked to worsened student performance (Khoshakhlagh & Faramarzi, 2012).

Female students self-reported a greater use of the internet, with a higher prevalence of IAP in this stratum observed for both education levels, as reported in previous studies (Muñoz-Miralles et al., 2016; Siomos et al., 2014). This trend may be related to the more communicative profile (Fioravanti et al., 2012), the higher frequency of internet use by women (Siomos et al., 2014), especially the use of social networks (Muñoz-Miralles et al., 2016). However, another study has found an association with males (Nemati & Matlabi, 2017). This finding may be related to differences in gender roles and their impact on internet insertion in young people's daily lives. In general, there is a small circulation of women and girls in public spaces, which limits group practices outside the domestic scope, such as leisure and sports. This emphasizes a cultural difficulty observed in Brazilian society and other countries, as internet usage is considered one of the few entertainment options among female students. However, even though gender asymmetries persist, the digital gap between men and women has narrowed.

Regarding the age range, it was observed that older ages are a protective factor, corroborating other studies performed in different countries (Nemati & Matlabi, 2017). Behavioral addiction can affect all age groups; however, younger subjects are considered more vulnerable to internet addiction and, therefore, deserve special attention from public health interventions (Munno et al., 2016).

Internet access allows the younger to interact with dynamism and technological subterfuge, allowing them to overcome age-characteristic fears and insecurities. Therefore, access via small touches on smartphones opens a series of opportunities and progressively replaces behavioral patterns that resemble past interactions, although interaction is always the final social goal. However, the current markedly distinct behavioral pattern is not risk-free, especially due to the types of platforms that provide interaction. The technologies used to extend access and increase use may be efficient but also invasive, requiring protective models against their abusive use.

We observed that better socioeconomic conditions influence the use of the internet. The economic class C showed a lower prevalence of IAP in both educational strata and class D/E in Higher Education. In addition, in this stratum, paid activity showed a positive association with the outcome. These results may refer to the greater purchasing power of devices with internet access and the burden of connection costs for the most favored economic classes (Ghahremani et al., 2020).

Alcohol consumption was associated with the outcome variable, as well as in surveys in Korea (Lee et al., 2015), Spain (Muñoz-Miralles et al., 2016), and the United States of America (Zhang et al., 2016). Some researchers pointed out that the inappropriate use of the internet can contribute to substance dependency for things like alcohol and other drugs (Muñoz-Miralles et al., 2016). The use of social networks daily can play a protective or risky role in the consumption of alcohol and other drugs, depending on the combination of economic and social factors of the user (Costa et al., 2012). A teenager may be influenced to try alcoholic drinks and other drugs when he is constantly exposed to photos, videos, and images of other young people consuming these substances on social networks.

A higher prevalence of IAP was also identified among those who reported impaired sleep. The excessive use of the internet, with intense exposure to the light of computer screens and cell phones, especially at night, can influence the sleep pattern and lead to insomnia, difficulty in relaxing before going to sleep, daytime sleepiness, and other sleep-related disorders associated with increased tiredness (Tan et al., 2016).

This study found a positive association between IAP and inadequate nutrition, as observed in previous studies (Bener & Bhugra, 2013; Bozkurt et al., 2018). The excessive use of the internet leads the student to sit in front of the computer for a long period of time, possibly skipping important meals or eating quickly with fatty snacks rich in sugars, and non-nutritive drinks, in addition to not practicing physical exercises (Bener & Bhugra, 2013; Bozkurt et al., 2018).

Variables related to lifestyle such as alcohol use, impaired sleep, and unbalanced diets were associated with IAP. It is worth mentioning that the cross-sectional design of the study does not allow inferences about the causality of these associations, and it can also occur in the opposite direction, that is, the influence of IAP on these variables, as observed in previous studies (Bener & Bhugra, 2013; Bozkurt et al., 2018, Costa et al., 2012, Khoury et al., 2017, Lee et al., 2015, Muñoz-Miralles et al., 2016, Zhang et al., 2016).

Frequent internet use can lead to dependence (Muñoz-Miralles et al., 2016). The present study allowed us to observe that students who use the internet frequently, especially on social networks, had a higher prevalence of IAP. Excessive use can lead to the replacement of the real world with the virtual one, causing changes in the way people interact. It affects the lives of users, compromising physical and mental health, also affecting student productivity, and contributing to school dropout and repetition (Lin et al., 2014; Seyrek et al., 2017). It can inhibit physical contact, lead to separation from social life, and, consequently, loneliness (Silva & Silva, 2017). As a vicious cycle, the internet becomes an alternative to fill the void of social isolation enhanced by the inappropriate use of this tool. Such inappropriate use is a relatively new problem that has been highlighted by the implications it causes in people's lives (Abreu et al., 2008).

Young people are active internet users in multiple contexts and with different purposes. For this public, the internet is an entertainment and a leisure tool, especially due to the growing interest in movies, series, and documentaries. The present study was performed in 2016 and, currently, with the expansion of access to streaming platforms, such as Globoplay, Netflix, Amazon Prime, and HBO GO, the time of internet use is expected to grow for this public.

Thus, professionals in the areas of health and education, along with the entire society, must (re)recognize this problem, which denotes the need for professional training and health education for the population. In this sense, it is suggested that Primary Health Care professionals, due to their proximity to the community, adopt actions for the prevention, tracking, and monitoring Internet Addiction in conjunction with the Health at School Program. These educational actions are necessary and urgent since the present study found that about 50% of the students surveyed are Problem Internet Users and are therefore one step away from becoming addicts.

The concern with the duration and time of internet access by the students is justifiable. However, this question should be analyzed along with the associated irreversible social and behavioral changes that are not necessarily deleterious. Developing protection policies for the users of digital platforms is crucial. These policies must contemplate the access and measures to promote its salutary use. Awareness and capacitation on this theme must be incorporated into the educational environment, allowing the development of methodological approaches to raise the students' awareness regarding their potential and risks. In this process, it is necessary to emphasize

the importance of physical interactions by awareness-raising through a practical model, including the practice of sports, group activities, and leisure outdoors, in contact with nature and culture.

Another relevant aspect is how soon preventive measures should be performed. In this sense, the intervention in pre-schooling should be objectified by health and educational politics, with the familiar group monitoring the time and use of digital resources, as well as encouraging interpersonal interaction without digital interference, strengthening affective and group bonding.

This study has the limitation of obtaining information through a self-administered questionnaire that potentially constitutes a bias in memory and the interpretation of the questions by the individuals investigated. However, regarding the IA indicators evaluated by the IAT items in this study, it is important to observe that the instrument displayed satisfactory levels of validity and reliability when applied to different populations, demonstrating adequate psychometric properties to assess the AI construct. It is also worth mentioning the limitation resulting from the sample characteristic that refers to schoolchildren, without those who are out of school having been addressed, in a municipality with a school dropout rate of 3.5%. The cross-sectional design restricts further conclusions about cause-effect relations. Nonetheless, the information obtained through a representative sample can subsidize future studies with longitudinal drawings. Educational actions are necessary and urgent since the present study found that about 50% of the students surveyed are Problematic Internet Users, therefore one step away from becoming addicts.

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