

ORIGINAL ARTICLE

Internet addiction in late adolescence: profile and patterns of use

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Manuscript received: january 2024
Manuscript accepted: may 2024
Version of record online: 2024

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Abstract

Introduction: cross-sectional school-based epidemiological survey, conducted in 2016 and 2017, from a representative sample of 15 to 19-year-old students enrolled in the Greater Vitória Metropolitan Region (RMGV-ES), Espírito Santo, Brazil.

Objectives: to analyze the association between Internet Addiction, sociodemographic characteristics and the pattern of Internet and social media use.

Methods: cross-sectional study with 2293 students. The sociodemographic data of the individuals and information on internet and social media dependence were verified using the Internet Addiction Test (IAT). Frequencies were calculated and Chi-square and Binomial Logistic Regression tests were applied.

Results: internet addiction was associated with adolescents in the early years ($p = 0.001$), those with less-educated household heads ($p = 0.018$), and those who spent four or more hours a day surfing the internet ($p < 0.001$) and those who used the Internet every day of the week ($p = 0.004$). Internet addiction was also associated with the use of Twitter (p -value = 0.040), subjective reasons for use ($p = 0.001$) and those who stopped using it for social reasons ($p = 0.001$).

Conclusion: It is recommended that daily screen time should not exceed four hours. Therefore, the implementation of public policies aimed at educating adolescents and their families, as well as protection aimed at the most susceptible individuals, are essential for the best growth and development of adolescents.

Keywords: internet addiction; addictive behavior; adolescence; social media; adolescent health.

Suggested citation: Bueno GN, Tavares H, Macedo LR, Neto ETS. Internet addiction in late adolescence: profile and patterns of use. *J Hum Growth Dev.* 2024; 34(2):255-267. DOI: <http://doi.org/10.36311/jhgd.v34.15753>

Authors summary

Why was this study done?

The study was carried out based on a survey, with high school adolescents aged 15 to 19, living in the Metropolitan Region of Greater Vitória, Espírito Santo, Brazil. The survey aimed to investigate various aspects of adolescents' lives that may favor exposure to diseases and problems in adulthood. Among the main aspects, we sought to identify how Internet Addiction is combined with other risk factors that are potentially harmful to adolescents' health.

What did the researchers do and find?

Verified the association between Internet Addiction, sociodemographic characteristics and pattern of Internet and social media use in adolescents between 15 and 19 years old. The highest chances of occurrence of Internet addiction were associated with adolescents in the early years of high school, those with a low educational level of the head of household, those who spent four or more hours a day browsing, and those who used the Internet every day of the week.

What do these findings mean?

Public policies that envision the education of adolescents and their families, as well as protection focused on the most susceptible individuals, should be developed, with emphasis on public schools. Companies that are responsible for the main social networks should deepen their understanding of their services and how adolescents interact with them, trying, if possible, to reduce the risk of addiction and protect the user from this situation.

INTRODUCTION

Increased use of the Internet and new technologies has mainly attracted younger individuals¹. Teenagers have shown a pattern of intense use, with daily time spent on social networks, messaging software and increasing site queries². In 1995, in its first year of operation, the Internet had 16 million users¹ with a gradual expansion in the following years. In 2009 there were 1.7 billion Internet users in the world and in 2017 there were more than 3.6 billion Internet users³. Brazil has more than 116 million people connected to the Internet (64.7% of the population) aged over 10 years⁴.

While using the Internet is a great resource for information, it can have a negative impact on individuals' lives when it influences the abandonment of household chores, family life, and friends, as well as delays and worsening academic activities. In these situations, individuals may experience symptoms of Internet addiction. The symptoms and consequences of this dependence are similar to those of chemical dependence, such as alcoholism and other drugs⁵.

Although there is still no consensus on the concept of Internet addiction, the scientific literature contains the terms "Internet addiction disorder" (Ivan Goldberg, 1995), as well as "Internet addiction" and "problematic Internet use" to designate such behavior⁶.

Some research has been done relating adolescent health to Internet overuse, recent studies have found associations with age, gender, depression, anxiety and emotional intelligence^{7,8}. Thus, it is understood that Internet addiction has constituted a new dysfunction of considerable prevalence among young people⁹.

In Brazil, 80% of children and adolescents between 9 and 17 years old are Internet users, daily use is intense and 66% access the Internet more than once a day. In addition, mobile phones became the main access device (83%), in addition to desktops, tablets or laptops or video game consoles¹⁰. Most of the population from 6 to 14 years old (98.5%) and from 15 to 17 years old (84.3%) is in school, which is an appropriate environment to monitor risk and protective factors⁴.

Despite the possibility that behaviors considered as risky to health when acquired in adolescence may be

extended into adulthood and lead to negative consequences for their quality of life¹¹, most studies only show the prevalence of Internet Addiction or relate it to few factors¹², such as cyberbullying¹³.

Recent studies have shown that severe Internet addiction is a frequent phenomenon among public school students ($p < 0.001$)¹⁴ and it has been associated with behavioral symptoms such as anxiety and depression, social problems and aggressive behavior¹⁵. Other authors, however, did not find an association between Internet addiction and adolescent gender, income or place of research¹⁶.

Under the assumption that Internet use by adolescents may negatively influence their health, it is relevant to verify the association between Internet Addiction, sociodemographic characteristics and the pattern of Internet and social media use, as there are still few studies that evaluated the association of Internet addiction with these and other factors associated with the adolescent target audience in Brazil.

The use of social networks, the use for study purposes and for entertainment are among possible reasons for using the Internet¹⁶. As it is a point still little explored in the literature, the reasons for using and not using the internet in association with Internet addiction deserve attention.

Thus, the objective of this article is analyze the association between Internet Addiction, sociodemographic characteristics and the pattern of Internet and social media use.

METHODS

Study design

This study is part of a school-based cross-sectional epidemiological survey conducted in 2016 and 2017 among a representative sample of students aged 15 to 19 years enrolled in the high school of the Greater Vitória Metropolitan Region (RMGV-ES), Espírito Santo, Brazil.

Study location and period

The sample of the students who participated in the research was made from sample quotas of each

municipality of RMGV-ES, considering the percentage distribution of students who were enrolled in high schools. For Internet Addiction, the sample was calculated based on an estimated prevalence of 21% for both sexes, a 95% confidence interval (95% CI), a standard error of 2,5% of the proportion of cases and an expected loss of 50%, which resulted in the minimum size of 2,009 adolescents.

With the help of the coordination of each school, the adolescents without any cognitive, hearing or visual impairment who signed the terms of consent were selected. Thus, the final sample analyzed comprised 2,293 students and data collection was performed in 54 schools that agreed to participate (43 public and 11 private schools).

Study population and eligibility criteria

The following information related to individuals' sociodemographic data was included: age (15-19 years), gender (male, female), ethnicity (white, black, brown, yellow, indigenous), school network (public, private), study shift (morning, afternoon, evening), year in high school (first year, second year, third year, fourth year), Social Class (A-B, C, D-E)¹⁷, Housing conditions¹⁸ and head of household's educational background.

Information related to behavior and use of Internet and social media was also obtained: number of computers at home (0 to 4 or more), permission to use electronic devices in the classroom, number of hours per day using the Internet (0 to 6 or more), number of days per week using the Internet (0 every day), means of use (computer, tablet or mobile), most used social network, and the reasons for using and not using the Internet were asked¹⁰. The reasons for using the Internet were grouped by the methodological choice of the authors of this article into objective reasons (to be informed/know the news, to study/learn about something, because of a specific program) and subjective reasons (to have fun/as entertainment), spending time/free time, as a company to me), as well as the reasons for not using the Internet were grouped into personal reasons (lack of interest, lack of computer skills, lack of need, to avoid contact with dangerous content) and social reasons (for being too expensive, for having nowhere to use, for lack of security or privacy).

To assess Internet addiction, we used the Internet Addiction Test (IAT), an instrument composed of 20 questions that assess the impact of the Internet on the individual's life. Possible answers range from "not applicable" to "never" to "always", with each question scoring from 0 to 5, the total points ranks the individual as a user without Internet Dependence (below 20 points), a user with low degree of dependence (between 20 and 49 points), a user with moderate degree of dependence (from 50 to 79 points) and high (from 80 to 100 points)⁶. For the statistical analyzes of the present study, following the direction of other authors^{13,19-21} the IAT was dichotomized into users considered nondependent (0-49 points) and dependent (≥ 50 points).

Data collection

Data collection was performed by trained interviewers and through a closed interview carried out in groups of students who individually filled out the form

on laptop computers. A software program was developed specifically for this step. After data collection, the data were stored on Microsoft Office Excel (version 2010) software. After correcting the database for typos and consistency, the data were analyzed using the Statistical Package for the Social Sciences (SPSS), version 21.0.

Data analysis

For the analysis of the reliability of the IAT, as well as to verify possible inconsistencies of the instrument, a pilot study was performed and the test-retest was performed with 46 adolescents who answered the survey form on two occasions with an interval of 21 days. To assess the degree of agreement between the answers, the Kappa statistical index and the McNemar test were used, considering a 95% confidence interval (CI). Prevalence-adjusted kappa ranged from 0.59 to 0.84 and the tendency for disagreement between responses was not significant. The overall reliability of the entire instrument that assessed Internet Dependence was assessed with Cronbach's alpha, the internal consistency was satisfactory for all items ($\alpha=0.93$).

For all variables analyzed, the absolute and relative frequencies were calculated and the chi-square tests were applied to test the associations between any Internet Dependence and the other variables studied. Next, the block binomial logistic regression (Enter method) was performed with variables with a significance level below 20%. The age variable was not incorporated into the regression model because it was associated with the year of high school in the chi-square test (p-value <5%), but it was removed from the regression because it was not significant. A significance level of less than 5% was taken into account for the final analysis.

Ethical and legal aspects of the research

The research project was submitted to the Research Ethics Committee (CEP) of the Federal University of Esp rito Santo, and was approved on February 25, 2015, under number 971.389/2015, respecting all the ethical parameters of Resolution no. 466 of 12 December 2012 from the National Research Ethics Commission (CONEP). This research relied on funding from the Esp rito Santo Research Support Foundation (FAPES).

RESULTS

In total, 2270 adolescents aged 15-19 years participated in the survey. Since 23.5% of the evaluated youths were classified as ordinary Internet users, the distribution of severity levels of Internet Dependence among the other participants was 50.5% for the low degree of dependence, 22.2% for moderate degree and 3.1% for severe dependence.

Regarding the association of Internet addiction (not dependent or dependent) with the sociodemographic characteristics of adolescents. Regarding age, gender and race/color, living conditions, social class, no significant associations were found (table 1).

Table 1: Distribution of degrees of Internet addiction with sociodemographic characteristics in adolescents aged 15-19 years in RMGV-ES – Vigiadolec, 2016/2017

Variables	Internet Addiction		Chi-Square	p-value	
	Not dependent N (%) (1965)	Dependent N (%) (575)			
Age	15 to 16	923 (54.5%)	339 (59.0%)	5.730	0.057
	17 years	449 (26.5%)	124 (21.5%)		
	18 to 19	323 (19%)	112 (19.5%)		
Gender	Female	1012 (60%)	353 (61%)	0.509	0.475
	Male	683 (40%)	222 (39%)		
Race-color	White:	486 (28.8%)	163 (28.4%)	0.776	0.942
	Black	292 (17.2%)	108 (18.8%)		
	Multiracial	775 (45.7%)	257 (44.8%)		
	Yellow	109 (6.4%)	36 (6.2%)		
School network	Indigenous	32 (1.9%)	10 (1.8%)	5.315	0.021*
	Public	1505 (88.9%)	490 (85.2%)		
	Private	189 (11.1%)	85 (14.8%)		
Study shift	Morning	1385 (82.1%)	466 (85.8%)	0.083	0.773
	Afternoon	301 (17.9%)	105 (14.2%)		
High-school year	First year	789 (46.5%)	291 (50.6%)	16.490	<0.001*
	Second year	439 (25.9%)	174 (30.2%)		
	Third and fourth years	467 (27.6%)	110 (19.2%)		
Social Class	A - B	183 (10.8%)	69 (12.0%)	1.296	0.523
	C	784 (46.2%)	273 (47.5%)		
	D - E	728 (43.0%)	233 (40.5%)		
Housing conditions	Adequate	90 (5.3%)	41 (7.1%)	3.120	0.210
	Inadequate	270 (16.0%)	97 (16.9%)		
Paid labor	Highly Inadequate	1335 (78.7%)	437 (76.0%)	1.177	0.278
	No	1292 (76.2%)	451 (78.4%)		
educational background of the Head of Household	Yes	403 (23.8%)	124 (21.6%)	10.645	0.031*
	Illiterate/incomplete Elementary	114 (6,9%)	34 (6,1%)		
	Complete Elementary I/incomplete elementary II	274 (16.5%)	110 (19.7%)		
	Complete Elementary II/Incomplete high-school	368 (22.0%)	143 (25.6%)		
	incomplete High-school/Incomplete College	575 (34.5%)	186 (33.4%)		
	College degree	335 (20.1%)	85 (15.2%)		

Just over a quarter of the sample was identified as Internet Dependent, meaning they scored 50 or higher on the IAT (25.3%). The frequency of answers to each of the IAT instrument questions is described in table 2.

Significant associations were found between Internet dependence and the school system ($p = 0.021$), with private school students having the highest percentages for Internet addicts (31%). Also associated with Internet dependence were young people in the early years of high school ($p < 0.001$) and the lowest level of education of the head of household ($p = 0.031$).

Regarding the association between the dependence of Internet with information on the use of social networks in adolescents from 15 to 19 years old from RGMV-ES, the variables related to the number of computers in the youth's

residence and the permission to use electronic devices in the classroom had no significant associations with Internet Dependency, such as the means of Internet access (table 3).

After the multivariate logistic regression of the factors associated with Internet Dependence, it was observed that the highest chance of being Internet dependent was associated to the initial grades of high school ($p = 0.001$); to the adolescents with the lowest educational background for head of household. ($p = 0.018$); to those who spent more hours using the Internet ($p < 0.001$) and more days per week ($p = 0.004$). Associations were also observed with the use of Twitter ($p = 0.040$), as well as those who used the Internet for subjective reasons ($p = 0.001$) and those who stopped using it for social reasons ($p = 0.001$) (table 4).

Table 2: Internet addiction among young people from 15 to 19 years old in RMGV-ES – Vigiadolec, 2016/2017

Questions asked	Not applicable	Rarely	Occasionally	Frequently	Almost always	Always	Total
							N (%)
How often do you think you spend more time on the Internet than you intended?	186 (8%)	342 (15%)	290 (13%)	553 (24%)	387 (17%)	520 (23%)	2278
How often do you abandon housework to spend more time on the Internet?	371 (16%)	586 (26%)	359 (16%)	371 (16%)	289 (13%)	302 (13%)	2278
How often do you prefer the excitement of the Internet to intimacy with your partner?	1289 (57%)	485 (21%)	170 (7%)	111 (5%)	85 (4%)	135 (6%)	2275
How often do you build relationships with new Internet friends?	391 (17%)	732 (32%)	342 (15%)	330 (14%)	212 (9%)	270 (12%)	2277
How often do other people in your life complain about the amount of time you spend on the Internet?	372 (16%)	501 (22%)	296 (13%)	335 (15%)	242 (11%)	530 (23%)	2276
How often do your school grades or assignments get worse because of the amount of time you spend on the Internet?	822 (36%)	688 (30%)	267 (12%)	189 (8%)	143 (6%)	167 (7%)	2276
How often do you access your email (or social network) before anything else you need to do?	317 (14%)	533 (23%)	284 (12%)	339 (15%)	256 (11%)	548 (24%)	2277
How often do you worsen your study / work performance or productivity because of the Internet?	840 (37%)	687 (30%)	272 (12%)	214 (9%)	122 (5%)	140 (6%)	2275
How often do you get defensive or secretive when someone asks you what you do on the Internet?	937 (41%)	631 (28%)	216 (9%)	149 (7%)	126 (6%)	217 (10%)	2276

Continuation - Table 2: Internet addiction among young people from 15 to 19 years old in RMGV-ES – Vigiadolec, 2016/2017

Questions asked	Not applicable	Rarely	Occasionally	Frequently	Almost always	Always	Total
How often do you block disturbing thoughts about your life thinking of connecting to the Internet to calm down?	893 (39%)	514 (23%)	223 (10%)	197 (9%)	184 (8%)	263 (12%)	2274
How often do you find yourself wondering when you're going to the Internet again?	629 (28%)	597 (26%)	244 (11%)	234 (10%)	201 (9%)	369 (16%)	2274
How often do you fear that life without the Internet would be boring, empty, not fun?	559 (25%)	484 (21%)	224 (10%)	251 (11%)	198 (9%)	560 (25%)	2276
How often do you explode, scream or get angry if someone bothers you while on the Internet?	779 (34%)	660 (29%)	234 (10%)	198 (9%)	160 (7%)	245 (11%)	2276
How often do you get a little sleep for being online late at night?	644 (28%)	596 (26%)	259 (11%)	244 (11%)	239 (11%)	292 (13%)	2274
How often do you feel concerned about the Internet when you are offline imagining that you could be online?	763 (34%)	654 (29%)	233 (10%)	201 (9%)	187 (8%)	236 (10%)	2274
How often do you find yourself saying "just a few more minutes" when you are logged in?	442 (19%)	471 (21%)	238 (10%)	329 (14%)	295 (13%)	499 (22%)	2274
How often do you try to cut down on the Internet and fail?	597 (26%)	566 (25%)	295 (13%)	302 (13%)	195 (9%)	319 (14%)	2274
How often do you try to hide from others the amount of time you are on the Internet?	1110 (49%)	564 (25%)	181 (8%)	137 (6%)	126 (6%)	155 (7%)	2273
How often do you choose to spend more time on the Internet instead of hanging out with others?	995 (44%)	631 (28%)	205 (9%)	170 (7%)	112 (5%)	160 (7%)	2274
How often do you feel depressed, moody, or nervous when you are disconnected, and that feeling goes away as soon as you log on to the Internet?	1143 (50%)	551 (24%)	167 (7%)	143 (6%)	124 (5%)	146 (6%)	2274

Table 3: Distribution of degrees of Internet addiction with information related to the use of social networks in adolescents aged 15-19 years in RMGV-ES – Vigiadolec, 2016/2017

Variables	Internet Addiction		Chi-Square	P-Value	
	Not dependent N (%)	Dependent N (%)			
Numbers of computers at home	None	347 (20.5%)	124 (21.6%)	2.045	0.728
	1	832 (49.1%)	272 (47.4%)		
	2	336 (19.9%)	119 (20.7%)		
	3	126 (7.4%)	37 (6.5%)		
	4 or more	52 (3.1%)	22 (3.8%)		
Permission to use electronics in the classroom	Yes	359 (21.2%)	125 (21.8%)	0.069	0.792
	No	1330 (78.8%)	449 (78.2%)		
Number of hours per day using the Internet	0 to 2	350 (22.8%)	23 (4.3%)	223.957	<0.001*
	2.1 to 4	307 (20.0%)	35 (6.5%)		
	4.1 to 6	260 (16.9%)	71 (13.2%)		
	6.1 or more	620 (40.3%)	407 (76.0%)		
Number of days a week you use the Internet	1 to 3	216 (13.3%)	18 (3.2%)	54.579	<0.001*
	4 to 6	169 (10.5%)	39 (7.0%)		
	Every day	1235 (76.2%)	503 (89.8%)		
How do you usually use the Internet	Computer	308 (18.2%)	100 (17.5%)	3.743	0.154
	Cell phone	1316 (77.7%)	459 (80.1%)		
	Other	70 (4.1%)	14 (2.4%)		
	Facebook	354 (21.2%)	106 (18.8%)		
	Whatsapp	919 (55.0%)	310 (54.9%)		
Most used Social networks	Youtube	178 (10.7%)	54 (9.6%)	18.034	0.003*
	Instagram	48 (2.9%)	11 (1.9%)		
	Twitter	66 (4.0%)	46 (8.1%)		
	Other	104 (6.2%)	38 (6.7%)		
	Objective use	1087 (70.9%)	437 (84.5%)		
	Subjective use	447 (29.1%)	80 (15.5%)		
Reasons for not using the Internet	Personal reasons	736 (82.5%)	145 (71.4%)	12.917	<0.001*
	Social Reasons	156 (17.5%)	58 (28.6%)		

Table 4: Multivariate logistic regression of factors associated with Internet dependence among adolescents aged 15-19 years in RMGV-ES – Vigiadolec, 2016/2017

Variables		Crude odds ratio	IC 95%	p-value	Adjusted odds ratio	IC 95%	p-value
School network	Public	1.381	1.04-1.82	0.022	-	-	-
	Private	1	-	-	-	-	-
High-school year	First year	1.566	1.22-2.00	<0.001	2.250	1.37-3.68	0.001
	Second year	1,683	1,28-2,20	<0,001	1,333	0,77-2,29	0,299
	Third and fourth years	1	-	-	1	-	-
	Illiterate/incomplete Elementary	1.175	0.74-1.84	0.482	2.205	0.96-5.05	0.062
educational background of the Head of Household	Complete Elementary I/ incomplete elementary II	1.582	1.14-2.19	0.006	2.197	1.14-4.22	0.018
	Complete Elementary II/ Incomplete High-school	1.531	1.12-2.08	0.006	2.044	1.12-3.71	0.019
	incomplete High-school/ Incomplete College	1.275	0.95-1.70	0.101	1.335	0.76-2.33	0.310
	College degree	1	-	-	1	-	-
Number of hours per day using the Internet	6.1 or more	9.989	6.43-15.51	<0.001	4.751	2.55-8.85	<0.001
	4.1 to 6	4.156	2.52-6.83	<0.001	2.133	1.02-4.42	0.042
	2.1 to 4	1.735	1.00-3.00	0.049	0.904	0.40-2.01	0.805
	0 to 2	1	-	-	1	-	-
Number of days a week you use the Internet	Every day	4,887	2,98-7,99	<0,001	2,922	1,41-6,03	0,004
	4 to 6	2.769	1.52-5.01	0.001	1.736	0.70-4.30	0.233
	1 to 3	1	-	-	1	-	-
How do you usually use the Internet	Other	0.616	0.33-1.14	0.124	-	-	-
	Cell phone	1.074	0.83-1.37	0.573	-	-	-
	Computer	1	-	-	-	-	-
	Facebook	0.888	0.69-1.14	0.355	0.867	0.52-1.44	0.583
	YouTube	0,899	0,64-1,25	0,529	0,716	0,37-1,36	0,310
Most used social networks	Instagram	0,679	0,34-1,32	0,256	0,484	0,13-1,71	0,261
	Twitter	2.066	1.38-3.07	<0.001	2.314	1.03-5.16	0.040
	Other networks	1.083	0.73-1.60	0.690	0.742	0.35-1.57	0.436
	WhatsApp	1	-	-	1	-	-
Reasons for using the Internet	Use	0.445	0.34-0.57	<0.001	1.828	1.15-2.90	0.010
	Problematic						
Reasons for not using the Internet	Not problematic use	1	-	-	1	-	-
	Social Reasons	1.887	1.33-2.67	<0.001	2.038	1.33-3.11	0.001
	Personal reasons	1	-	-	1	-	-

DISCUSSION

A total of 2270 students aged 15-19 participated in the study. Of these, 25.3% showed Internet dependence (IAT \geq 50 points). Dependence on the Internet is a new dysfunction of considerable prevalence among adolescents⁹, which is close to 17.9% of the Brazilian population.

According to the criteria proposed by Young (1998)²², the data from this study show that the prevalence of common Internet users (IAT from 0 to 19 points) was 23.7%. Mild Internet dependence (IAT 21 to 49 points) was present among 51% of adolescents, 22.2% of young people were classified as moderately dependent (IAT 50 to 79 points), and 3.1 % severely dependent (IAT 80 to 100 points).

Similar values of severe dependence were found by Hawi (2012)²³ in a sample of 833 Lebanese students with an average age of 15 years. This study found in 4.2% of the sample significant problems of Internet use. Another author found a lower number of Internet addiction among adolescents, 74.7% of normal Internet users and 25.3% of dependents of varying degrees²⁴. In another study²⁵ only 1.6% of students aged 15-18 interviewed showed pathological use of the Internet.

When the Internet dependence classification was applied in users considered nondependent (0-49 points) and dependent (\geq 50 points), a percentage of 25.3% was found. Similar data to those of XIM *et al.*²¹, who found a general prevalence of Internet dependence of 26.5% using the same criteria. However, in a study of 5590 students in Greece, Internet dependence was 10.1%.¹³ Another survey conducted in 2014²⁶ showed how the prevalence of Internet addiction among adolescents (14 to 17 years old) varied between different European countries: 1% in Greece, 7.9% in Iceland and it reached 22.8% in Spain. Data related to the prevalence of Internet dependence should be carefully evaluated in the different studies cited, as different methods may preclude an accurate comparison between the results.

Regarding Internet Dependence between public and private school students, it was found that public school students are more likely to be Internet dependent (1.3 times) (p-value $<$ 5%). These data were also found in the study by Brito *et al.*²⁷, who assessed the factors associated with the lifestyle of public high school students and remained associated with the variables self-perception of quality of life, depressive symptoms and Internet dependence.

Regarding the sociodemographic characteristics of adolescents, age was not associated with a higher chance of being dependent on the Internet. In this study, age and year of high school were significantly associated variables (p-value $<$ 5%), therefore in the regression model. At the end, only the school year variable was maintained. First-year students were about twice as likely to be dependent compared to third and fourth-year students, *i.e.* older adolescents. It is possible that students who were enrolled in more advanced grades, probably those in the higher age group, would eventually incorporate other social occupations into their lives, such as: work, internships, love relationships, among others, which decrease the use of Internet. Corroborating this information, data on Internet access and use in Brazil²⁸ indicate that the habit was more

common in the adolescent population compared to older individuals. However, Abreu *et al.*²⁹ reported that there is no specific age group for Internet Dependence to be found, which may exist at any age.

Another association found was that adolescents who lived in homes with less educated heads of household were twice as likely to be dependent on the Internet compared to those with more educated heads of household. The scientific literature found no associations like those found in this study^{30,31}, but it supports the idea that families from lower social strata are at greater risk of becoming dependent on the Internet³². It is also believed that families with less educated parents, because they are less familiar with the Internet, may be unaware of the risks that Internet use presents. This finding seems to point to the importance and relevance of the relationship between children and their guardians in articulating the relationship with the Internet and preventing its potential complications. Moreover, having completed high school or incomplete high school did not increase the chances of dependence in adolescents.

Regarding Internet usage patterns by adolescents, adolescents who spent four hours or more per day on the Internet were significantly more likely to be dependent. While those who spent less than four hours a day showed no chance of dependence. In addition, teens who used the internet every day of the week were also three times more likely to be addicted. This phenomenon was verified in the study by Tsitsika *et al.*²⁶, who found a higher likelihood of addictive behavior in adolescents who make frequent use of online activities for at least six days a week. Increased use of hours and for more days a week is assumed to expose the adolescent to the Internet more and increase the chance of making him or her dependent. More intense use increases the adolescents' chance of becoming dependent on the Internet.

Regarding the social networks accessed, Facebook, WhatsApp, YouTube and Twitter were the most frequent among adolescents. In Brazil, Facebook was still the most accessed site by Brazilians (67%), including as a source of information²⁸. However, it was the use of Twitter that most presented the adolescent with a chance to develop Internet addiction, which was more than twice as high as users who chose WhatsApp as the most accessed social media. Twitter is today's main microblogging platform and has been used as a data source for various areas of knowledge as well as for information dissemination. Perhaps the structures of social networks may favor the loss of control over the Internet. One of the possible theories about the relationship between Internet addiction and the use of social networks is that adolescents use social networks to escape reality and for entertainment, as well as to escape internal and external problems³³.

Internet addiction is linked to increased use of social networks²⁶ and possibly because it is less accessible by people close to it, the Twitter user ends up spending more time connected. In the study by Durkee *et al.*³⁴ carried out in 11 European countries, access to social networks was one of the online activities considered most enjoyable by adolescents. In this context, internet addiction is characterized as a symptom that there is a problem with the individual, since it can use social networks as a form

of well-being, hiding other established social or personal problems.

In this study, there was a higher prevalence of dependence, almost twice as likely, in individuals who used the Internet for subjective use reasons: “to have fun/as entertainment” (48.2%), “to spend time/free time” (19%), “as a company to me” (7%). Data that make it possible to understand a possible relationship between the pleasure provided by the network or a possibility of escape from loneliness with intense use. Other authors also associated the abusive use of the Internet with the appearance of physical and mental health problems, which showed comorbidities, such as: depression, overweight, head and back pain, as well as insufficient sleep³⁵.

The reasons for not using the Internet were associated with social reasons (twice as likely). Brazilian data³⁶ corroborate the reasons for not using it, revealing that, in households that did not use the Internet, the reason was “lack of interest” (34.8%) and “because it is an expensive service” (29.6%). In this study the social reasons for not using it were: “for being expensive” (3.2%), “for having no place to use” (10%) and “for lack of security or privacy” (6.4%). Possibly, socioeconomic issues collaborate to restrict access, a fact that could create a sense of deprivation that would induce the individual to abuse the Internet when gaining access to it.

Among the limitations of this study, it is important to highlight that the data were obtained at a single moment, so a possible temporal causal association may be difficult to establish between the internet dependence and the variables analyzed. Another limitation is in relation to the instrument, which was answered individually by the adolescents and it is subject to the veracity of the information provided, but it is an instrument already validated for the Portuguese language⁶. It is a cut-off point (50) to characterize the Internet dependence, which allowed the dependence in a dichotomous rather than gradual (low, moderate or severe) dependence, allowing us to establish striking inferences.

Internet addiction is a frequent phenomenon among adolescents, associated with sociodemographic characteristics and the pattern of use of the Internet and social media, which increase the chances of its occurrence. The highest chances of occurrence of Internet addiction were associated with adolescents in the early years of high school, those with a low educational level of the head of household, those who spent four or more hours a day browsing, and those who used the Internet every day of the week. Internet addiction was also associated with the use of Twitter, and subjective reasons for use (leisure and socialization).

Thus, as with other behavior-related dependencies of individuals, those who are most socially vulnerable are at greater risk of becoming dependent. The ones responsible for the adolescents have an important role in determining the frequency of Internet use, avoiding daily access and not exceeding four hours of use.

Public policies that envision the education of adolescents and their families, as well as protection focused on the most susceptible individuals, should be developed, with emphasis on public schools.

Finally, companies that are responsible for the main social networks should deepen their understanding of their services and how adolescents interact with them, trying, if possible, to reduce the risk of addiction and protect the user from this situation.

■ CONCLUSION

It is recommended that daily screen time should not exceed four hours between adolescents. Therefore, the implementation of public policies aimed at educating adolescents and their families, as well as protection aimed at the most susceptible individuals, are essential for the best growth and development of adolescents.

Companies that are responsible for the main social networks should deepen their understanding of their services and how adolescents interact with them, trying, if possible, to reduce the risk of addiction and protect the adolescents from this internet addiction.

Author Contributions

Bueno, George Nunes: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Resources, Supervision, Validation, Writing – original draft; Tavares, Hermano: Conceptualization, Methodology, Resources, Supervision, Writing – original draft; Macedo, Lygia Rostoldo: Formal analysis, Investigation, Writing – Review & Editing; Santos-Neto, Edson Theodoro: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Writing – original draft, Writing – Review & Editing. Conformance: <<https://wp.scielo.org/wp-content/uploads/credit.pdf>>

Funding

This research relied on funding from the Espírito Santo Research Support Foundation (FAPES). Edital FAPES/CNPq/MS-Decit/SESA n° 10/2013.

Acknowledgments

The authors would like to thank the Espírito Santo Research Support Foundation (FAPES) for the master’s and doctorate’s scholarship provided.

Conflicts of Interest

The authors declare that they have no conflicts of interest regarding the authorship and publication of this article.

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Resumo

Introdução: inquérito epidemiológico transversal de base escolar, realizado em 2016 e 2017, a partir de uma amostra representativa de estudantes de 15 a 19 anos matriculados na Região Metropolitana da Grande Vitória (RMGV-ES), Espírito Santo, Brasil.

Objetivo: analisar a associação entre dependência de internet, características sociodemográficas e padrão de uso de Internet e mídias sociais.

Método: trata-se de estudo transversal com 2.293 estudantes. Dados sociodemográficos dos indivíduos e informações sobre dependência de internet e redes sociais foram verificados por meio do Internet Addiction Test (IAT). Foram calculadas frequências e aplicados testes Qui-quadrado e Regressão Logística Binomial.

Resultados: a dependência de internet foi associada a adolescentes nos primeiros anos ($p = 0,001$), àqueles com chefes de família menos escolarizados ($p = 0,018$) e àqueles que passavam quatro ou mais horas por dia navegando na internet ($p < 0,001$) e aqueles que utilizavam a Internet todos os dias da semana ($p = 0,004$). O vício em internet também esteve associado ao uso do Twitter (p -valor = 0,040), a motivos subjetivos de uso ($p = 0,001$) e a quem deixou de usá-lo por motivos sociais ($p = 0,001$).

Conclusão: recomenda-se que o tempo de tela diário não deva ser superior a quatro horas. Assim, a implementação de políticas públicas que visem educação do adolescente e sua família, bem como a proteção voltada aos indivíduos mais suscetíveis, são imprescindíveis para o melhor crescimento e desenvolvimento do adolescente.

Palavras-chave: dependência de internet, comportamento viciante, adolescência, mídias sociais, saúde do adolescente.

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