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Evaluation of Internet addiction and the quality of life of Brazilian adolescents from public and private schools

Avaliação da dependência de Internet e qualidade de vida em adolescentes Brasileiros de escolas públicas e particulares

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Abstract

This study evaluated the profile of public and private high school students (N = 254, M_{age} = 15.1, SD = 1.3) in the city of *São Paulo* in relation to their Internet use patterns and quality of life. We used the Internet Addiction Test and the Pediatric Quality of Life Inventory. About 70% of the students had moderate Internet addiction. Those students from public school showed higher scores of Internet addiction ($p < 0.001$) than students from private schools. Regarding the quality of life, those from private school showed better scores regarding academic performance ($p < 0.01$) and worse scores in social aspect ($p < 0.05$). The data showed a strong association between Internet addiction and poor levels of quality of life, as observed in studies from other countries.

Keywords: Internet addiction; Adolescent behavior; Quality of life.

Resumo

Este trabalho avaliou o perfil de estudantes em relação ao padrão de uso de Internet e qualidade de vida, tomando como sujeitos de pesquisa alunos do ensino médio (N = 254, M_{idade} = 15,1, DP = 1,3) de escolas públicas e particulares da cidade

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de São Paulo. Utilizou-se o Teste de Dependência em Internet *e o* Pediatric Quality of Life Inventory. *Aproximadamente 70% dos estudantes apresentaram dependência média de* Internet. *Estudantes de escola pública apresentaram maiores níveis de dependência grave em relação aos da escola particular (p < 0,001). Em relação à qualidade de vida, estudantes da escola particular apresentaram melhores indicadores no aspecto social (p < 0,01), enquanto aqueles da escola pública apresentaram melhores indicadores no aspecto escolar (p < 0,05). Os dados indicaram uma forte associação entre dependência de* Internet *e menores indicadores de qualidade de vida, conforme observado em estudos de outros países.*

Palavras-chave: *Dependência de Internet; Comportamento do adolescente; Qualidade de vida.*

The technological revolution that began in the twentieth century had a steep rise after the United States Federal Networking Council defined and coined the term "Internet", originally created by members of the World Wide Web network. Since then, the use of the Internet and digital technology or media has spread quickly and increasingly, covering all social classes, genders and age groups, thereby promoting and changing the mode of expression of diverse social, cultural, educational, economic and political activities.

Due to the increasing and intense frequency of Internet use (especially among children and adolescents), individuals born in the second half of the 1980's began to be referred to as digital natives or the digital generation (or the Internet Generation, [IG]). According to Helsper and Eynon (2010), digital natives are those whose acquisition and use of new technological and digital media occurs through natural learning with complete mastery. Internet access was initially restricted to desktop computers and notebooks, but spread due to mobile technology. Currently, cell phones, smartphones, tablets and other devices allow the Internet to be accessed at any time and from any location, thereby favoring an increase in network use frequency and the frantic advent of new social and technological media. The use of digital technologies has been completely absorbed into daily life and has promoted new forms of social interaction and organization, especially among adolescents (Hamm et al., 2014).

The term "digital media" refers to any medium that uses a computer or digital equipment to create or exploit something supported by the Internet (Greenfield, 1999). Based on this definition, when we refer to "the Internet" in the present study, we mean all digital media based on the use of the Internet. There is no precedent in the history of technology and computer science for the rate at which children and adolescents have used and are connected to different technologies and digital media. According to the TIC KIDS Online Brazil study conducted by the Brazilian Internet Steering Committee (Barbosa, 2013), the first contact of adolescents with the Internet and/or digital media occurs at an increasingly earlier age and at a significantly growing frequency of use. Because adolescence is a natural period of greater vulnerability, studies have suggested that adolescents are more likely to engage in risky behaviors, such substance abuse (Frade, De Micheli, Andrade, & Souza-Formigoni, 2013; Pinheiro, Andrade, & De Micheli, 2016) and Internet addiction (Li, O'Brien, Snyder, & Howard, 2015; Lim et al., 2015).

Internet Addiction (IA) is a recent mental disorder that was included in the latest version of the Diagnostic and Statistical Manual of Mental Disorders and its diagnosis is often more complex than that of other addictions because the Internet provides some direct benefits to the subject (interactivity and availability of access to a great deal of content that facilitates practical life). According to some authors, what differentiates addicts is a complete loss of impulse control and a link between their living habits and Internet use that occurs apart from the benefits provided by the network (Suissa, 2015).

Research from various countries indicates that IA is increasing in the general population (Winkler, Dörsing, Rief, Yuhui, & Glombiewski, 2013). Some studies in Asia showed that the prevalence of IA was approximately 26% in Hong Kong students (Shek & Yu, 2015), 21% in the

Philippines (Mak et al., 2014), 12% in South Korea (Heo, Oh, Subramanian, Kim, & Kawachi, 2014) and 11% in China (Li, Zhang, Lu, Zhang, & Wang, 2014). In Western countries, the rates recorded in Portugal for frequent (daily) Internet use (95% in the 10- to 15-year-old age group and 60% in the 16- to 74-year-old age group) are noteworthy (Pontes, Patrao, & Griffiths, 2014).

Some authors observed that IA adolescents are more likely to have some critical impairments in their quality of life, such as higher prevalence of mood and anxiety disorders (mainly social phobia) (Elhai, Dvorak, Levine, & Hall, 2017), poor sleep quality (Schweizer, Berchtold, Barrense-Dias, Akre, & Suris, 2017), pain (Lee, Kyung, Lee, Moon, & Park, 2016) muscle fatigue (Liang & Hwang, 2016) and poor academic performance (Samaha & Hawi, 2016). In Brazil, a recent study showed that 62% of college students (*N* = 150) were considered as IA, but the authors did not observe any association with psychiatric disorders (Della-Méa, Biffe, & Ferreira, 2016).

Given the above information, there is no denying the influence of the Internet on people's lives or the high levels of IA prevalence in different age groups and different countries. Furthermore, little is known about the effect of the overuse of digital media on the important bonding and social interactions during adolescence or on the family and academic contexts.

In this study, we evaluated the levels of Internet use and their relationship with the quality of life of students from public and private schools in the city of *São Paulo*. We defined the quality of life based in the concept of Health-Related Quality Of Life (HRQOL) and its determinants to comprise those aspects of overall quality of life that can affect health, including physical and/or mental aspects. On the individual level, HRQOL comprises includes mental and physical perceptions (mood, anxiety) and including functional status, social support and health risks status. Regarding the community level, HRQOL includes the resources of a specific community, policies, and practices that influence the population's health.

We hypothesized that: (1) Those adolescents with IA would have worse quality of life indicators in their different dimensions; (2) The prevalence of IA would be higher among adolescents from private schools due to socio-economic factors.

Method

Sample

Two hundred fifty four students (*N* = 352) in the 1st, 2nd and 3rd years from the city of *São Paulo*, Brazil, participated in this study. Among them, 37.5% (*n* = 95) were from a private school and 62.5% (*n* = 159) were from a public school.

Instruments

General Identification Questionnaire: It was used for the collection of sociodemographic data: name, age, gender, grade, public or private school, and two economic classification questions proposed by the Brazilian Association of Market Research Institutes (Abipeme, 2004). Their economic stratum was based on household characteristics, as the possession and number of durable goods, employment of domestic workers, educational level of the head of the household and the number of bathrooms. The participants were classified into five possible strata (A, B, C, D and E) based on the sum of score of each item.

Young Internet Addiction Test (YIAT): This instrument comprises 20 items that evaluate the degree of digital (Internet) addiction based on ranges of addiction: no addiction (0-19 points), mild addiction (20-49 points), moderate addiction (50-79 points) and severe addiction (above 80 points). It was adapted and validated in Brazil (Conti et al., 2012).

Pediatric Quality of Life Inventory (PedsQL): This instrument comprises 23 questions to evaluate the quality of life in different aspects of daily life, such as emotional, health, sociability and academic aspects (Scarpelli et al., 2008).

Procedures

During the first contact with the schools, we clarified the study objectives and the methodology involved in implementing the instruments with students in the three high school grades. After receiving each institution's consent, we scheduled a meeting to detail the instruments and procedures for their application and to provide forms of free and informed consent for signatures. In the public school, a draw was performed in the morning period to randomly select two classes per high school year (1st, 2nd and 3rd years) for a total of six classes due to the greater number of high school classes (four per year). In the private one, there was one class for each high school year and therefore there was no need for selection. In both schools, there was a brief presentation of the objectives of the study prior to application of the questionnaire and an invitation for students to participate voluntarily that emphasized the importance of honesty when providing answers.

The students voluntarily signed the consent form before filling the questionnaires. Additionally, all school principals signed the Terms of Free and Informed Consent form. All questionnaires were filled anonymously and in all schools an urn was placed at the participants' classroom door for students to deposit their answer sheet and feel more confident regarding anonymity.

The data were analyzed based on normal distribution (*Kolgomorov-Smirnoff*) and, in cases of abnormality, the data were analyzed by using the Z-*score* or Napierian logarithm (Log_{10}) procedures. For continuous variables, Student's *t* test was used for independent samples in combination with the Analysis of Variance (1- and 2-way ANOVA). When statistical significance was detected, the Duncan's a *posteriori* test was used to evaluate the differences among groups. The Fisher's exact and Chi-square tests were used for nominal variables. The significance level adopted in all analyses was 5%. The analyses were performed using Statistica 14.0 (Statsoft, San Jose, California, United States of America).

The Committee of Ethics in Research of the *Universidade Federal de São Paulo*, Unifesp, Federal University of *São Paulo*) approved this study (nº 238.374/CAEE: 11167112.1.0000.5505).

Results

Regarding the sociodemographic data, in the private schools there was a prevalence of socioeconomic A stratum without school delays, individuals who did not work, lived with both parents and had a good relationship with those with whom they lived (Table 1). In the public school, most of students were classified among B, C and D strata with the highest concentration in stratum C (53%). In addition, about 60% did not have a school delay (31% had a delay of 1-2 years), 22% worked, and more than a half lived with both parents

Table 2 shows the use of digital media of students from public and private schools. Only 3.0% of all students did not show any harmful use of digital media. It was detected that nearly 20.0% of students from private schools had "mild addiction" and 24.0% from public school had severe addiction. Few differences in use habits were observed between students from both schools, for example, daily use (always) of digital media during meals was reported by more than half (52.5%) of the public school students, whereas 44.5% of the private school students reported rarely doing so. Conversely, 48.0% of private school students reported that the use of the Internet while in the bathroom was a daily habit, whereas 66.5% of the public school students denied this behavior or said they rarely did so. In general, a significant prevalence of students in both school categories reported almost always sending/checking messages while walking in the street (57.0% and 46.5%) and using digital media all the time or much of the time when in the presence of friends (40.0% and 37.0%). A total of 82.0% of private school students reported not having use limits imposed by their parents, whereas 30.0% of public school students reported limitations. There were no differences between the students regarding the resources on which they spent the most time. Many of them reported spending most of their time on social networking sites (Facebook) and

Table 1
Sociodemographic data of students from public and private schools

Sociodemographic data	Public		95% CI	Private		95% CI	Test	*p*	Effect size
	n	%		*n*	%				
Gender									
Male	76	48	[0.39, 0.55]	56	59	[0.48, 0.68]	2.96	0.08	0.11
Female	83	52	[0.44, 0.60]	39	41	[0.31, 0.51]			
Economic class							157.95	**	0.78
A	6	4	[0.01, 0.08]	81	86	[0.77, 0.92]			
B	41	26	[0.19, 0.33]	13	13	[0.06, 0.21]			
C	84	53	[0.44, 0.60]	1	1	[0.00, 0.05]			
D	28	18	[0.12, 0.25]	0	0	[0.00, 0.00]			
School delay							87.91	***	0.58
No delay	104	66	[0.58, 0.63]	85	90	[0.82, 0.95]			
1 or 2 years	50	31	[0.23, 0.38]	9	9	[0.04, 0.17]			
3 years or more	5	3	[0.01, 0.07]	1	1	[0.00, 0.05]			
Currently working							18.92	***	0.27
No	124	78	[0.70, 0.84]	95	98	[0.92, 0.99]			
Yes	35	22	[0.15, 0.29]	2	2	[0.00, 0.07]			
Lives with							10.97	*	0.20
Father and mother	83	53	[0.44, 0.60]	72	74	[0.63, 0.82]			
Father only	8	5	[0.02, 0.09]	4	4	[0.01, 0.10]			
Mother only	54	35	[0.27, 0.43]	17	17	[0.09, 0.25]			
Family members/institution	11	7	[0.03, 0.12]	5	5	[0.01, 0.11]			
Relationship with those with whom the student lives							5.17	0.07	0.14
Good	120	75	[0.67, 0.81]	82	88	[0.80, 0.94]			
Normal	28	19	[0.13, 0.25]	13	11	[0.05, 0.18]			
Poor	10	6	[0.03, 0.11]	1	1	[0.00, 0.06]			

Note: $^{*}p < 0.01$, $^{**}p < 0.001$, $^{***}p < 0.05$. Public school ($n = 159$), Private school ($n = 95$).

messaging applications. Regarding the advantages of using digital media, most private school students mentioned a decrease in shyness and situational control accomplished by being able to go off-line and end a conversation when they wanted to. In contrast, a higher prevalence of public school students mentioned not feeling alone as being a major advantage.

Figure 1 shows the means for the four aspects of quality of life identified by the PedsQL questionnaire based on the school type. The figure has to be analyzed both by its area (the larger the area, the higher the mean score in each aspect) and by the shape of the area (the more regular the polygon, the more homogeneous the mean values between the aspects). Notably, the quality of life concerning the physical, emotional, social and educational aspects was not similar among students from the public ($p < 0.001$) and private ($p < 0.001$) schools. The educational and emotional aspects had lower means when compared to the physical and social aspects in both school categories.

Table 2
Patterns and habits of digital media use of students from public and private schools

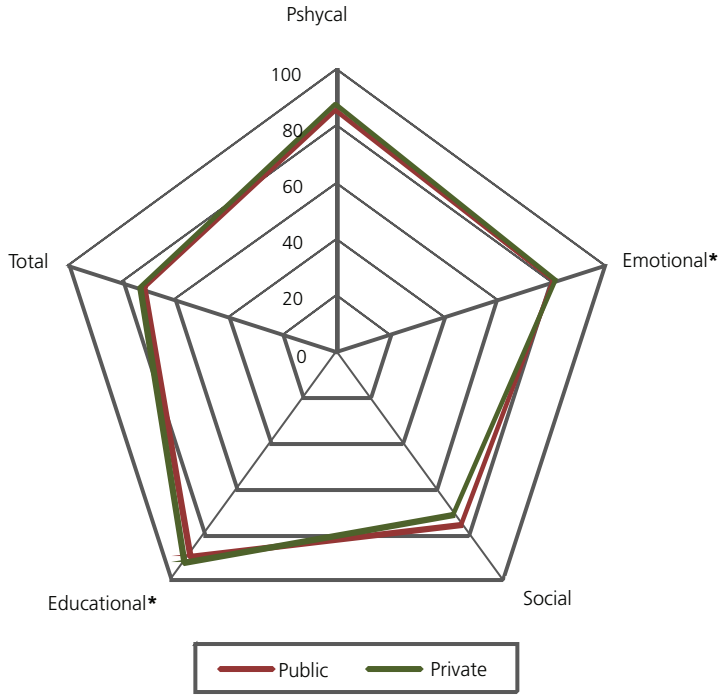
Patterns and habits	Public		95% CI	Private		95% CI	Test	*p*	Effect size
	n	%		*n*	%				
Level of Internet addiction							13.89	***	0.23
No addiction	6	3	[0.01, 0.07]	3	3	[0.00, 0.08]			
Mild	12	7	[0.03, 0.12]	20	22	[0.14, 0.31]			
Moderate	104	66	[0.58, 0.73]	62	65	[0.54, 0.74]			
Severe	37	24	[0.17, 0.31]	10	10	[0.05, 0.18]			
Do you use a smartphone/tablet during meals?							49.68	***	0.44
No	58	37	[0.29, 0.45]	36	37	[0.27, 0.47]			
Yes, almost always	84	52.5	[0.44, 0.60]	16	18.5	[0.11, 0.28]			
Yes, but rarely	17	10.5	[0.06, 0.16]	43	44.5	[0.34, 0.54]			
Do you use a smartphone/tablet when you go to the bathroom?							17.40	***	0.26
No	105	66.5	[0.58, 0.74]	40	42	[0.32, 0.52]			
Yes, almost always	36	23	[0.16, 0.30]	45	48	[0.38, 0.58]			
Yes, but rarely	18	10.5	[0.06, 0.16]	10	10	[0.05, 0.18]			
What do you spend most time on when using a smartphone/tablet?							3.89	0.42	0.12
Social networking sites	73	45	[0.37, 0.53]	41	42	[0.32, 0.52]			
Messaging apps	56	35	[0.27, 0.43]	32	30	[0.21, 0.40]			
Chat rooms and forums	3	2	[0.00, 0.05]	1	1	[0.00, 0.05]			
Email	11	6	[0.03, 0.11]	5	5	[0.01, 0.12]			
Other (search sites, games)	14	8	[0.04, 0.13]	16	16	[0.09, 0.24]			
Do you access the Internet when with friends?							3.10	0.07	0.11
No	19	12	[0.07, 0.18]	5	6	[0.02, 0.12]			
Yes	140	88	[0.81, 0.92]	90	94	[0.86, 0.97]			
If yes, how often?							24.79	***	0.31
All the time	14	10	[0.05, 0.15]	9	10	[0.05, 0.18]			
Most of the time	42	30	[0.23, 0.37]	24	27	[0.18, 0.37]			
Occasionally	84	60	[0.52, 0.67]	57	63	[0.52, 0.72]			
What are the advantages of a virtual conversation as opposed to face-to-face[a]									
Reduced shyness	93	59	[0.51, 0.66]	59	61	[0.50, 0.70]	0.33	0.56	0.03
I don't have to be present (off-line)	5	3.5	[0.01, 0.08]	21	23	[0.15, 0.32]	23.26	***	0.30
Control the length of conversation	20	12	[0.07, 0.18]	28	30	[0.21, 0.40]	11.07	***	0.20
Distance not a problem	41	25.5	[0.19, 0.33]	40	43	[0.33, 0.53]	7.29	***	0.16
Not feeling alone	36	23	[0.16, 0.30]	3	3	[0.00, 0.08]	17.36	***	0.26
There are no advantages	10	6	[0.03, 0.11]	17	17.5	[0.10, 0.27]	8.43	***	0.18

Table 2

Patterns and habits of digital media use of students from public and private schools

Patterns and habits	Public		95% CI	Private		95% CI	Test	*p*	Effect size
	n	%		*n*	%				
Do your parents limit the time you spend on the Internet?							14.16	***	0.23
No, they do not limit it	95	59.5	[0.51, 0.67]	78	82	[0.73, 0.89]			
Yes, they limit it	48	30	[0.23, 0.37]	12	13	[0.06, 0.21]			
They limit it but I go online without permission	17	10.5	[0.06, 0.16]	5	5	[0.01, 0.11]			

Note: ***$p < 0.001$. [a]Descriptive levels of Chi-square or Fisher's exact test for multiple choice responses. Public school (n = 159), Private school (n = 95). The effect size (Cramer's V Test) was based on the following degrees of freedom: df = 1 (0 to 0.1 = small effect); (0.11 to 0.3 = medium effect); (0.31 to 1, high effect); df = 2 (0 to 0.07 = small effect); (0.08 to 0.21 = medium effect); (0.22 to 1, high effect). df = 3 (0 to 0.06 = small effect) (0.07 to 0.17 = medium effect) (0.18 to 1.0, high effect); df = 4 (0 to 0.05 = small effect) (0.06 to 0.13 = medium effect) (0.14 to 1.0, high effect).



CAPTIONS

Figure 1. *Quality of life aspects (physical, emotional, social, educational and overall) of the sample considering public and private schools (data expressed as means).*

Note: *$p < 0.05$.

Table 3 shows data related to quality of life based on all aspects evaluated by the PedsQL instrument. The higher the mean in a particular area, the better the quality of life in that area. Overall, students in both school categories who had severe Internet addictions had a lower mean quality of life in the physical, emotional, social and educational aspects, indicating greater impairment in their quality of life compared to the other two groups.

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Table 3
PedsQL and YIAT scores of students from public and private schools

Instruments	Public		Private		Test	*p*	Effect size	Public	Private	Public	Private	Public	Private
	M	SD	M	SD				1st Quartile		Median		3rd Quartile	
PedsQL - Physical													
Mild	91.0	6.5	89.0	12.5	1.67	0.09	0.20	84.5	85.0	90.5	92.0	97.0	99.0
Moderate	87.0	12.0	90.0	11.0	1.98	*	0.26	78.0	86.0	90.5	94.0	97.0	100.0
Severe	84.0	14.5	75.0	16.0	5.11	***	0.58	75.0	64.0	89.0	76.5	96.0	86.0
PedsQL – Emotional													
Mild	77.0	22.0	82.5	18.0	2.05	***	0.27	59.0	70.0	80.0	85.0	100.0	100.0
Moderate	74.5	18.0	73.5	20.0	0.41	0.68	0.05	65.0	60.0	75.0	75.0	90.0	90.0
Severe	66.0	20.0	53.0	24.0	4.64	***	0.58	51.5	34.0	65.0	52.5	84.0	69.0
PedsQL – Social													
Mild	90.0	16.0	92.0	10.5	1.08	0.27	0.14	79.0	86.5	100.0	97.5	100.0	100.0
Moderate	90.0	12.0	93.0	9.5	2.07	*	0.27	80.0	90.0	95.0	95.0	100.0	100.0
Severe	83.0	16.0	83.0	10.5	0.00	1.00	0.00	82.5	75.0	90.0	80.0	100.0	92.5
PedsQL – Educational													
Mild	77.0	17.5	82.0	14.0	2.36	***	0.31	61.5	75.0	80.0	85.0	95.0	90.0
Moderate	77.0	16.5	70.0	16.5	3.27	***	0.42	65.0	60.0	80.0	70.0	90.0	85.0
Severe	71.0	13.0	54.0	13.0	10.08	***	1.30	60.0	44.0	70.0	55.0	80.0	60.0
PedsQL – Total													
Mild	85.0	9.0	86.5	10.5	1.20	0.22	0.09	78.0	84.0	84.0	87.5	94.5	95.5
Moderate	82.5	11.0	82.5	10.0	0.00	1.00	0.00	74.0	76.0	84.0	82.5	90.0	89.0
Severe	78.0	11.5	67.5	13.0	6.70	***	0.85	71.5	57.5	79.5	68.0	87.0	74.0

Note: $^{*}p < 0.05$, $^{***}p < 0.001$.

Public school (n = 159), Private school (n = 95). The interpretation of the effect size (Cohen' D Test) is: 0.2 = small, 0.5 = moderate and ≥ 0.8 = large.

PedsQL: Pediatric Quality of Life Inventory ; YIAT: Young Internet Addiction Test.

Discussion

To the best of our knowledge, this is the first study in Brazil evaluating the impact of IA and its relationship with quality of life among students of public and private schools. We observed a prevalence of severe Internet addiction of approximately 24.0% and 10.0% in the students from public and private schools respectively. In a study conducted in Finland with students between 12 and 18 years of age, 4.7% of the girls and 4.6% of the boys met the criteria for IA (Korkeila, Kaarlas, Jaaskelainen, Vahlberg, & Taiminen, 2010). However, some authors observed a higher prevalence. In a sample of Chinese high school students from the city of Wuhan, nearly 13.0% met the criteria for severe IA (Li et al., 2014). Elsewhere in China, the prevalence was even higher. Shek and Yu (2015) conducted a six-year longitudinal study with high school students from Hong Kong and found levels of severe IA ranging from 17.0% to 30.0% of the students.

With regards to digital media use habits, the present study showed that more than half of the adolescents reported using technological media (smartphones or tablets) during mealtimes, whereas near 30% used such media when in the bathroom and 90% reported that they remained connected to the network and communicated with friends even if they were in their presence. Taken together, these findings may be indicative of difficulties in impulse control. Part of them are defined as the following: (a) an inability to resist a specific impulse or a temptation to perform a behavior despite the inconvenience that this may bring; (b) a feeling of tension before performing the behavior; and (c) feelings of pleasure, gratification or relief during the behavior (Greenfield, 1999). In this study, 82% of adolescents from private schools and 60% of adolescents from public schools reported having no use limits imposed by their parents/guardians. Block (2008) stated that parents generally had little or no knowledge of their children's use of digital media and therefore did not realize or were slow to realize that it might be abusive. Additionally, the lack of parental monitoring can generate insecurity in children and adolescents and a feeling of not being cared for, leading to the development of low self-esteem.

Text messages via mobile phone have become the favorite mode of communication among young people, especially among adolescents. It has been studied that the frequency of sending text messages exceeds all other forms of communication, including talking on the telephone and face-to-face communication (Lu, Katoh, Chen, Nagata, & Kitamura, 2014). In this sense, Antheunis, Valkenburg, and Peter (2012) conducted a study to evaluate adolescents' preferences regarding means of communication, and observed that 63% of the participants used text messaging as their primary form of communication. In this study, we observed that 90% of the students used some digital media in the presence of friends, which draws our attention to the form of socialization and interaction that has been developing between students and their peers. As some authors observed, the social relationships have changed due to high technology (Schulz, Bergen, Schuhmann, & Hoyer, 2015).

Nearly 50% of the subjects explained that this communication option was a way to avoid having to talk directly to people, and only 7% said they preferred to speak personally. In this study, when asked about the advantages of a virtual conversation, 60% reported feeling less shy, 11% reported the advantage of being able to choose to respond or not to the sender and be absent from the conversation when they wanted, and 20% reported the advantage of being able to end the conversation whenever they wanted to. These data indicate the construction of a new form of relationship among adolescents. Most likely, a generation has been arising that uses digital media as a primary resource to cope with their personal difficulties. This generation is closely associated with technology and thus physical communication has become disposable. One of the advantages of virtual communication is the availability of time to write and edit what one wants to communicate and to send the message at a suitable time (control of time belongs to the subject) (Schulz et al., 2015). Additionally, greater control is evident in the timing and way the subject reveals themselves to

the other party without the unpredictability and disadvantages that face-to-face contact can often generate.

Therefore, we can assume that although the virtual world provides greater control over situations and leads to a sense of comfort and safety for the subject, it compromises the identification of subtleties observed only in face-to-face relationships (non-verbal communication, facial expressions and body gestures) and thus impairs social skills as a whole. Some authors observed that adolescence is the time of life when there is a natural increase in social interactions and that the overuse of the Internet and building virtual relationships could compromise psychosocial development, thereby generating "superficial" relationships, feelings of "false intimacy" and difficulties in establishing affective bonds (Yang & Brown, 2016).

The role of socio-emotional skills in the development of children and adolescents has been well established (Yang & Brown, 2016). Countless studies have shown that adolescents with a greater repertoire of socio-emotional skills have more self-esteem, fewer negative feelings, better school performance, fewer behavioral problems and therefore a greater ability to address interpersonal problems (Motoca, Williams, & Silverman, 2012). In this sense, impairment in developing these skills caused by the overuse of digital media by children and adolescents is a matter of concern. Tsitsika et al. (2011) observed that adolescents were more vulnerable to pathological Internet use because they had less ability to control the urge to do something interesting to them and considered themselves invulnerable and unaware of the adverse consequences of excessive use.

The data regarding the discomfort reported by participants in situations in which the use of the Internet was impossible were also worrying. Most of the participants reported feeling irritated and nervous when interrupted while online and worried about being offline. Similarly, in a recent study of adolescents in Taiwan the authors found a positive correlation between a high intensity of Internet use and the frequency of aggressive behavior (Lim et al., 2015). These data indicate that aggression can be triggered by anxiety, social isolation and insecurity, which is associated with withdrawal symptoms (Luciana & Segalowitz, 2014).

In this study, 51.0% of adolescents reported always sleeping less or resisting sleep to continue being online. Similar data were also observed by Antheunis et al. (2012), who conducted a study with young people between 16 and 19 years of age and found that most of them lost hours of sleep during the week because they were engaged in the mobile phone network; 34.0% said they slept 4-5 hours a night and 15.7% reported sleeping only 2-3 hours a night. Besides, insufficient hours of sleep in adolescence may interfere with developmental processes; psychosocial progress and neurocognitive development, and reduce energy, concentration and memory consolidation (Marinelli, 2015). A poorer quality of life in all aspects was observed among the severely and moderately addicted students as evidenced by their lower means.

In contrast with the study hypothesis, we observed few differences in habits and behavior related to the use of technology among students from both types of school. This finding suggests that behavior related to digital media use habits is part of adolescence and is not specific to a particular social or academic group. It should be noted that these conclusions in no way deny the benefits and advances brought about by the Internet and technology. However, their inappropriate use should also be emphasized. Although technology in itself is useful, its irrational use leads to negative effects on an individual's physical and psychological health, social development and general wellbeing. Furthermore, providing exacerbated and unsupervised access to children and adolescents exposes them to many risks, such as pedophilia and pornography. Any activity that generates pleasure or a sense of wellbeing has the potential to create addictive or at least inappropriate or abusive behavior (Luciana & Segalowitz, 2014). This finding highlights the importance of supervision and monitoring on the part of parents/guardians regarding adolescents' use of the Internet and other technologies.

This study has important limitations that must be highlighted. First, we classified students

regarding the Internet use based only on their YIAT' scores. Because IA is a and new complex phenomenon, it is possible that the Internet use would be confounded with smartphone/tablet use. Until now, however, there is no smartphone addiction test validated in Brazil. Second, the sample size in this study is not representative in the city of *São Paulo* and it might be possible to find different data with a significant number of students from public and private schools. Third, we did not analyze possible psychiatric comorbidities commonly associated with IA, such as anxiety and mood disorders. In the future directions, we intend to evaluate a possible association between IA and psychiatric disorders not only in students, but also in the adult population and in college students.

Contributors

F.A.D. CRUZ participated in the study design, preparation of the manuscript and data collect. D. DE MICHELI and A.L.M. ANDRADE cooperated in the study design, data analyses and preparation of the manuscript. A. SCATENA cooperated in the data analyses and preparation of the manuscript. All the authors are responsible for its contents, having revised and approved its final version.

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