

SCIENTIFIC ARTICLE

The impact of internet addiction on the mental health of college students from the central area of Portugal

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KEYWORDS

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Mental Health;
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Abstract

Introduction: Mental health has an imperative roll in general health, and it's known that most mental and physical diseases are influenced by a combination of biological, psychological and social factors, in which takes place the Internet addiction.

Objectives: identify the sociodemographic variables that influence the mental health of college students; identify academic variables that influence the mental health of college student.

Material and methods: Quantitative, descriptive-analytical and cross-sectional study with 511 college students of the Central Region of Portugal. It was used a questionnaire on sociodemographic and academic context, and were used the following scales: Mental Health Scale - PhD José Luís Pais Ribeiro (2011); Internet Addiction Test, Portuguese version by Pontes e Patrão (2013).

Results: Mostly female students, standing largely in the age group of 17-21 years, living in urban areas, with an average family income. Younger students have high addition to the internet (62.2%). Sex interfere with the mental health of students. The lower the negative impact of adding Internet emotions / feelings and lower its negative impact on daily life, the less anxiety, depression and loss of emotional / behavioral control of college students. The negative impact on daily life establishes a direct relationship with the positive affect, indicating that the greater the negative impact, less positive affect students.

Conclusions: The results obtained point to the need to implement mental health programs, by conducting two workshops, promoting social interaction among students, to help them find more effective ways to respond to the daily challenges.

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Introduction

Internet addiction is a co-morbid and highly harmful reality, hence the concern and the interest raised by this Cyber-Psychology as a scientific area (Tao, Huang e Wang 2010).¹

Being admitted to college represents a challenge in the students' psychological and interpersonal growth, as well as in their autonomy, that can trigger feelings of insecurity, helplessness, loneliness and the emergence of psychopathologies.

Mental Health was defined by WHO (2013)² as "a state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully and is able to make a contribution to his or her community."

The objectives that we want to achieve are: to identify the influence of the socio-demographic and academic variables on students' mental health and to analyse the influence of internet addiction on college students' mental health.

511 students from Polytechnic Schools of Castelo Branco, Coimbra, Guarda and Viseu and from the Escola Superior de Enfermagem de Coimbra and from the University of Beira Interior have participated in this study.

In short, we confirmed that men show higher average rate values in every mental health dimensions, mainly when it comes to psychological distress and to the loss of emotional/behavioural control. Women show higher average rates when it comes to emotional ties and psychological well-being. Female students show a lower internet addiction (86.7%), while younger students show a higher internet addiction (62.2%). The lower the negative impact of internet addiction on emotions/affections, the lower the college students' anxiety.

Theoretical fundamentals

When the time comes for youngsters to face the end of their teenage days, the beginning of their adulthood and the process of adaptation to college life, they have to face other tasks as well (Almeida, 2014),³ namely *Academic tasks*: the learning of new studying strategies, new teaching and evaluation methodologies and a greater autonomy and accountability; *Social tasks*: new interpersonal relationships with their family, schoolmates, teachers and with the whole college community; *Personal tasks*: the strengthening of their own personality, self-knowledge; a greater autonomy in managing their personal life and *Vocational/institutional tasks*: development of a professional identity.

Internet is an organized network that allows the communication between supercomputers. It was born and blossomed during the Cold War, in the 60s of last century, under the USA Department of Defense. Between 1982 and 1987 the world witnessed the birth of a language that would become common to all computers, the same language we use today, and the boom of the personal computers industry. More than a technological topic, this is a social matter, in which technology cannot be separated from social, economical, cultural and political trends and it's a factor that will cause changes in *modus vivendi* and *modus operandi* (Roque et al, 2014).⁴

Data from the 2015 *Internet World Stats* show that 46.5% of the population have access to the internet. In this context, Asia represents 48.2% of the internet users around the world, followed by Europe with its 18%, Latin America and the Caribbean with 10.2%, Africa with 9.8%, North America with 9.3%, the Middle East with 3.75% and, at last, Oceania and Australia with 0.8%. National data presented by PORDATA (2015) show that 71.1% of all households have a personal computer at home and 70.2% of them have an internet connection.

Using the internet brings advantages at a social, psychological, economical, technological and functional level and it is quite useful in our daily life, as long as it is not perceived as "addictive".

The etiology of internet addiction is unknown and often multifactorial. Although it remains indefinite, it is currently under consideration for inclusion in DSM-V. The prevalence of this addiction is about 12% among younger individuals living in Asia and ranges from 2% to 8.1% in western countries (Tao et al, 2010).¹

The study conducted by EU Kids Online (Smahel et al, 2012), quoted by Pontes and Patrão (2013), covering 19 834 children from 25 European countries, aged between 11 and 16, showed that 29% of those children showed one or more than one of the traits associated with excessive use. Recent studies are investigating the etiological factors or the causes which are associated with the disease (Montag and Reuter, 2015).⁶

Beard (2005), quoted by Pontes and Patrão (2013),⁶ consider internet addiction as a behavioural condition (non-substance-related), because of the interactions individual/computer that cannot be controlled by the subject. This lack of control over the use of the internet will affect daily activities, the user's psychological, mental and emotional states, his school performance and his social interactions. Internet addiction is part of the 2013 DSM-V "Internet Gaming Disorder" topic: it is caused by interpersonal difficulties, or social, psychological and biological problems associated with signs of depression, bipolar disorder, anxiety, or obsessive-compulsive disorders, feeding and eating disorders, weight loss or gain, backache, visual problems or tendonitis.

Material and methods

Those are the investigation questions which were defined: Which socio-demographic and academic variables can influence the mental health of college students from the centre of Portugal? What kind of influence does internet addiction have in those students' mental health?

The study follows a quantitative, non-experimental, cross-sectional, descriptive, analytical and correlational method, as shown in the following schematic representation (Fig. 1).

The sample is formed by 511 students from Polytechnic Schools of Castelo Branco, Coimbra, Guarda and Viseu and from the Escola Superior de Enfermagem de Coimbra and the University of Beira Interior in 2015/2016.

The data collection instrument contains questions that will allow characterizing the students' socio-demographic and academic background. Pais Ribeiro Mental Health Inventory (2001) is formed by 38 items and assesses psychological distress and psychological well-being and presents Cron-

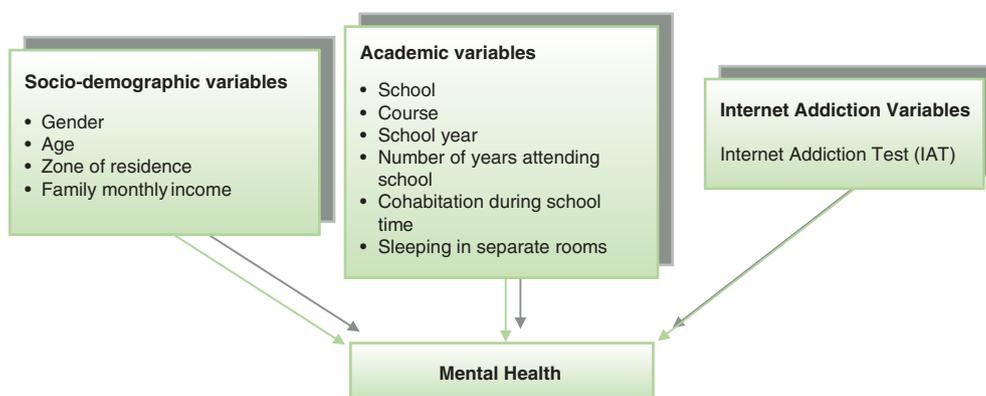


Figure 1 Design of the study.

bach’s alpha values, reliability results and bipartition coefficients with a high internal consistency. The Portuguese version (Pontes e Patrão, 2013) of Young’s Internet Addiction Test which consists of 20 items that will help measure mild, moderate or severe levels of internet addiction and in which the higher the score, the higher the level of addiction. It presented Cronbach’s alpha, bipartition coefficient and a factorial structure with good internal consistency.

After obtaining the approval of the Ethics Committees from all the schools involved, we formatted and submitted the questionnaires online.

Results

The majority of the participants (65.8%) are between 17 and 21 years old, 69.4% are female students, which results in statistically significant differences ($\chi^2 = 18.882$; $P = .000$). Most of them live in an urban environment and 75.7% of them state that their monthly income is neither high nor too low, falling under the middle income class. The majority of these students are female students who attend a health care course at the Polytechnic schools of Viseu and Coimbra, which shows statistically significant differences ($\chi^2=46,858$; $P = .000$). Most of them live with a schoolmate during school time, which presents some statistical relevance ($\chi^2 = 9.265$; $P = .026$) and 15.5% share a room.

Statistics regarding internet addiction show a higher rate in the “Total Factor” (mean 15.53 ± 10.987) and a lower value in the item “impact on emotions/affections (mean 7.20 ± 6.564). The measures of symmetry show a normal distribution and the coefficients of variation show a high dispersion when compared to the mean values found (Table 1).

Female participants show a lower internet addiction and male students a higher internet addiction, with statistically significant differences ($\chi^2 = 11.728$; $P = .003$).

Younger students show high rates when it comes to mild addiction (66.7%), moderate addiction (67.4%) and higher addiction (62.2%). In students who are between 22 and 24 and in older students severe internet addiction is the most frequently reported situation (25.2%).

Students who live in a rural area (58.5%) show a mild internet addiction (51.9%), a moderate addiction or a severe addiction (35.1%).

From those who live in an urban environment, (64.3%) show a severe addiction, (48.1%) show a moderate addiction and (41.5%) a mild addiction, with statistical relevance ($\chi^2 = 15.668$; $P = .000$).

From students who fall under the middle income class, 47.1% show a mild internet addiction, 77.3% show a moderate addiction and 74.8% show a severe addiction.

The students who attend the Polytechnic School of Viseu are those who display a milder internet addiction (68.9%), a more moderate addiction (51.5%) and show evidence of a more severe internet addiction (52.4%). 32.6% among first year freshmen show a mild addiction, 36.5% a moderate addiction and 38.5% of them a severe internet addiction. Those who live with a schoolmate during their school time show a lower internet addiction rate (57.0%) and this lower rate is followed by the one shown by students who live with their parents and siblings (33.3%).

In the statistics concerning the students’ mental health, we found out that the highest value is related to the “Psychological distress” dimension (mean 101.99 ± 21.918) and the lowest has to do with the “emotional ties” dimension (mean 12.63 ± 3.222), followed by the “depression” dimension (mean 21.19 ± 5.379) (Table 2).

Male students are those who show higher rates in all the dimensions, with greater attention given to the “psychological distress” and “loss of emotional/behavioural control” dimensions. Female students show higher rates when it come to the “emotional ties” and “psychological well-

Table 1 Statistics regarding Internet Addition

Mental health	Min	Max	M	SD	CV (%)	Sk/error	K/error
Impact on emotions/affections	0.00	43.00	7.20	6.564	91.16	14.79	17.62
Negative impact on daily life	0.00	29.00	8.32	5.460	65.62	6.11	0.45
Total factor	0.00	72.00	15.53	10.987	70.74	9.63	8.09

Table 2 Statistics regarding Mental Health

Mental Health	Min	Max	M	SD	CV (%)	Sk/error	K/error
Anxiety	13.00	60.00	40.07	9.611	23.98	-3.75	-2.94
Depression	6.00	30.00	21.19	5.379	25.38	-6.08	-1.53
Loss of emotional/behavioural control	12.00	54.00	40.71	7.922	19.45	-7.04	0.27
Positive affections	17.00	66.00	41.07	10.105	24.60	-1.81	-3.09
Emotional ties	4.00	18.00	12.63	3.222	25.51	-4.37	-1.81
Psychological Distress	35.00	144.00	101.99	21.918	21.49	-5.31	-1.89
Psychological well-being	22.00	84.00	53.71	12.388	23.06	-2.65	-2.50

being” dimensions, with statistically significant differences, in all dimensions but “emotional ties” ($P = .147$).

Older participants show higher average rates when they refer to the “anxiety” dimension ($OM = 270.13$) and the “psychological distress” dimension. Younger students show higher average rates when they are dealing with the “psychological well-being”, “depression”, “loss of emotional/behavioural control” and “positive affections” dimensions. There’s no statistical significance here.

Students who live in a rural environment show higher average rates in all the mental health dimensions. There are statistically significant differences in all dimensions, except for the “positive affections” and “emotional ties”.

Students who attend the Polytechnic School in Castelo Branco show more anxiety, depression, loss of emotional/behavioural control and also give more importance to positive affection, more affective ties, psychological distress and psychological well-being. Right after them, according to the scores they obtained, come the students who attend the Escola Superior de Enfermagem de Coimbra, with statistically significant differences in anxiety ($P = .019$), depression ($P = .014$) and psychological distress ($P = .029$). First year students and those who have a room of their own during their school time show a severe internet addiction.

In the relationship between internet addiction and anxiety, we find correlations in the variables that are analysed, and those correlation values range between $r = -0.195$, in the negative impact on daily life, and $r = -0.205$, in the impact on emotions/affections. There are contrary relationships between the variables with statistical relevance in both factors of internet addiction.

The predictor variable for anxiety is internet addiction, which explains 48.0% of the variation, and the explained variance is adjusted to 0.4%. The regression standard error is 18.793, the F-test is $f = 12.796$ ($P = .000$) and the t value is $t = 43.476$ ($P = .000$). They show a statistical significance and therefore we can conclude that the impact on emotions/affections and the negative impact on daily life that are part of the regression model can explain the anxiety students feel.

Through beta standardized coefficients we could conclude that both factors vary inversely with anxiety and this evidence shows that the lower the impact on emotions/affections and the lower the impact on everyday life, the lower the anxiety. The same perspective shows us that the negative impact on everyday life is the variable which has the highest predictive importance. The variable with the least importance is the impact on emotions/affections.

As far as the relationship between internet addiction and depression is concerned, the results show that the correla-

tion values range from $r = -0.218$, in the negative impact, and $r = -0.217$, in the impact on emotions/affections.

We found evidence that there are inverse relationships between the variables, with statistical relevance in both internet addiction factors.

The predictor variable of depression is internet addiction, which explains 0.57% of the variation, the regression standard error is 20.938, the F-test is $f = 15.316$ ($P = .000$) and the t-value is $t = 72.163$ ($P = .000$), with a statistical significance, showing that both internet addiction factors can explain depression.

Through beta standardized coefficients we could conclude that both factors vary inversely with depression, which suggests that the lower the impact on emotions/affections and the negative impact on daily life, the lower the depression. The negative impact on everyday life is the variable that has the highest predictive importance. The variable with the least predictive importance is the impact on emotions/affections.

In the relationship between internet addiction and the loss of emotional/behavioural control the correlation values range from $r = -0.271$, in the impact on emotions/affections, to $r = -0.233$, in the negative impact on everyday life. Inverse relationships between the variables are formed, with statistical relevance in both internet addiction factors.

The predictor variable of the loss of emotional/behavioural control is internet addiction, which explains 0.79% of the variation and the explained variance is adjusted to 0.75%. The regression standard error is 16.932, the F-test is $f = 21.654$ ($P = .000$) and the t-value is $t = 56.267$ ($P = .000$), with a statistical significance, showing that both internet addiction factors can explain the loss of emotional/behavioural control.

Through beta standardized coefficients we could conclude that both factors vary inversely with the loss of emotional/behavioural control, which suggests that the lower the impact on emotions/affections and the negative impact, the lower will the students’ loss of emotional/behavioural control be. The impact on emotions/affections is the variable that has the highest predictive importance. The variable with the least importance is the negative impact on daily life.

In the relationship between internet addiction and positive affection, the correlation values range from $r = -0.066$, in the impact on emotions/affections, to $r = -0.171$, in the negative impact on everyday life and we witness inverse relationships between the variables and the negative impact on everyday life is the only variable with statistical significance.

The predictor variable of positive affection is internet addiction, which explains 0.33% of the variation and the explained variance is adjusted to 0.29%. The regression standard error is 18.101, the F-test is $f = 8.743$ ($P = .000$) and the t-value is $t = 40.542$ ($P = .000$), with a statistical significance, showing that both internet addiction factors can explain positive affection.

Beta standardized coefficients show that the impact on emotions/affections varies inversely with positive affection, while the negative impact on everyday life varies directly. The negative impact on everyday life is the variable that has the highest predictive importance. The variable with the least importance is the impact on emotions/affections.

In the relationship between internet addiction and emotional ties, the correlation values range from $r = -0.192$, in the impact on emotions/affections, to $r = -0.239$, in the negative impact on everyday life, and we witness inverse relationships between the variables, as well as a statistical significance.

The predictor variable of the emotional ties is internet addiction, which explains 0.59% of the variation and the explained variance is adjusted to 0.55%. The regression standard error is 20.882, the F-test is $f = 15.914$ ($P = .000$) and the t-value is $t = 42.722$ ($P = .000$) with statistical significance. Both internet addiction factors can explain emotional ties.

Beta standardized coefficients show that both factors vary directly with the emotional ties dimension.

The negative impact on everyday life is the variable that has the highest predictive importance. The variable with the least importance is the impact on emotions/affections.

In the relationship between internet addiction and Psychological distress, the correlation values range from $r = -0.241$, in the impact on emotions/affections, to $r = -0.223$, in the negative impact on everyday life, showing inverse relationships between the variables, as well as a statistical significance for both factors.

The predictor variable of psychological distress is internet addiction, which explains 0.65% of the variation and the explained variance is adjusted to 0.61%. The regression standard error is 17.695, the F-test is $f = 17.699$ ($P = .000$) and the t-value is $t = 49.937$ ($P = .000$), with statistical significance.

Beta standardized coefficients show that both factors have a direct relationship with psychological distress. The impact on emotions/affections is the variable that has the highest predictive importance. The variable with the least predictive importance is the negative impact on people's daily life.

In the relationship between internet addiction and psychological well-being, the correlation values range from $r = -0.104$, in the impact on emotions/affections, to $r = -0.201$, in the negative impact on everyday life, and we witness inverse relationships between the variables with statistical relevance for both factors.

The predictor variable of psychological well-being is internet addiction, which explains 0.42% of the variation and the explained variance is adjusted to 0.38%. The regression standard error is 17.354, the F-test is $f = 11.195$ ($P = .000$) and the t-value is $t = 44.241$ ($P = .000$), with statistical significance.

Beta standardized coefficients show an inverse relationship between the impact on emotions/affections triggered

by internet addiction and the psychological well-being. The negative impact of the internet addiction in everyday life creates a positive relationship with psychological well-being.

The negative impact on everyday life is the variable that has the highest predictive importance. The variable with the least importance is the impact on emotions/affections.

Discussion and conclusion

Female participants show a mild internet addiction, while male students show a severe internet addiction. Those results are in agreement with those conducted by Chakraborty et al (2010);⁷ Frangos, Frangos e Kiohos (2010);⁸ Alavi et al (2011);⁹ Kuss and Griffiths (2013)¹⁰ and Özcan e Gokcearslan (2013).¹¹

Studies conducted by Hall and Parsons (2001)¹² didn't find any relationship between the subjects' gender and internet addiction.

Younger students confess being more addicted to the internet. This evidence is confirmed by Chen and Fu (2009);¹³ Hasanzadeh, Beydokhti and Zadeh (2012);¹⁴ Mazalin and Moore (2004),¹⁵ Kennedy, Wellman and Klement (2003);¹⁶ Sato (2006)¹⁷ and Silva (2014).¹⁸

Those who live in rural areas show a lower internet addiction. These results are in agreement with the studies conducted by Sato (2006)¹⁷ and Beutel et al (2011).¹⁹ Students who fall under the middle-monthly income class show higher internet addiction values. First year freshmen are those who show more severe and moderate internet addictions.

Those who live in a room of their own show a higher internet addiction.

People with limited social support are more addicted to the internet and loneliness/isolation is a factor which is associated with the evolution of internet addiction.

Male participants show higher average values in all mental health dimensions. Female participants show higher average rates in dimensions like "emotional ties" and "psychological well-being" with statistically significant differences in nearly all mental health dimensions.

The lower the negative impact of internet addiction on emotions/affections and the lower its impact on people's daily life, the less evident will be college students' anxiety, depression and the loss of emotional/behavioural control. Studies conducted by Seo, Kang and Chae (2012)²⁰ support these results.

The negative impact on daily life establishes an inverse relationship with positive affection. We also found out that the impact on emotions/affections triggered by internet addiction establishes a direct relationship with psychological well-being and that the negative impact of internet addiction on daily life creates a direct relationship with psychological well-being.

These results may be used to support further researches, like the development of longitudinal researches that would bring a better understanding of college students' mental health (always with internet addiction in mind) and provide information to identify the relationship between internet addiction and the emotional intelligence of these students and the effects this kind of relationship has on their mental health.

Evidence found point out the need to implement mental health programmes as precociously as possible and to promote social interaction among students. To achieve this goal, support offices should be made available. We consider that this kind of support facility can play a crucial role. Therefore, they have to be specialized and located in a place to which all the students who seek their support can easily have access.

Conflicts of interest

The authors declare that there are no conflicts of interest.

References

1. Tao R, Huang X, Wang J, Zhang H, Zhang Y, Li M. Proposed diagnostic criteria for internet addiction. *Addiction*. 2010;105:556-64.
2. World Health Organization. Investing in mental health: evidence for action. Geneva: WHO; 2013.
3. Almeida J. A saúde mental global, a depressão, a ansiedade e os comportamentos de risco nos estudantes do ensino superior: estudo de prevalência e correlação. Lisboa: Universidade Nova de Lisboa; 2014.
4. Roque, M. Internet. In: Saraiva CB, Peixoto B, Sampaio D, coordinators. *Suicídios e Comportamentos Autolesivos*. 1st ed. Lisboa: Lidel, edições técnicas, LDA; 2014.
5. Pordata. Agregados domésticos privados com computador, com ligação à Internet e com ligação à Internet através de banda larga em Portugal. 2015. Available at: [http://www.pordata.pt/Portugal/Agregados+dom%C3%A9sticos+privados+com+computador++com+liga%C3%A7%C3%A3o+%C3%A0+Internet+e+com+liga%C3%A7%C3%A3o+%C3%A0+Internet+atrav%C3%A9s+de+banda+larga+\(percentagem\)-1158](http://www.pordata.pt/Portugal/Agregados+dom%C3%A9sticos+privados+com+computador++com+liga%C3%A7%C3%A3o+%C3%A0+Internet+e+com+liga%C3%A7%C3%A3o+%C3%A0+Internet+atrav%C3%A9s+de+banda+larga+(percentagem)-1158)
6. Pontes H. A dependência à internet: fundamentação empírica, teórica e clínica - da psicologia e psicométrica à ciber-psicologia. Lisboa: Instituto Universitário Ciências Psicológicas, Sociais e da Vida; 2013.
7. Chakraborty K, Basu D, Vijaya Kumar KG. Internet addiction: Consensus, controversies, and the way ahead. *East Asian Archives of Psychiatry*. 2010;203:123-32.
8. Frangos CC, Frangos CC, Sotiropoulos I. Problematic internet use among Greek university students: An ordinal logistic regression with risk factors of negative psychological beliefs, pornographic sites, and online games. *Cyberpsychol Behav Soc Netw*. 2011;14:51-8.
9. Alavi SS, Maracy MR, Jannatifard F, Eslami M. The effect of psychiatric symptoms on the internet addiction disorder in Isfahan's University students. *J Res Med Sci*. 2011;16:793-800.
10. Kuss DJ, Griffiths MD. Excessive Online Social Networking: Can Adolescents Become Addicted to Facebook? *Education and Health*. 2011;29:68-71.
11. Özcan S, Gokcearslan S. An outcome evaluation study on Internet addiction. *Global Journal on Technology*. 2013;3:790-5.
12. Hall AS, Parsons J. Internet addiction: College student case study using best practices in cognitive behavior therapy. *J Ment Health Couns*. 2001;23:312-27.
13. Chen SY, Fu YC. Internet use and academic achievement: Gender differences in early adolescence. *Adolescence*. 2009;44:797-812.
14. Hasanzadeh R, Beydokhti A, Zadeh FD. The prevalence of Internet addiction among university students: A general or specific problem? *J Basic Appl Sci Res*. 2012;2:5264-71.
15. Mazalin D, Moore S. Internet use, identity development and social anxiety among young adults. *Behaviour Change*. 2004;21:90-102.
16. Kennedy T, Wellman B, Klement K. Gendering the digital divide. *IT & Society*. 2003;1:72-96.
17. Sato T. Internet addiction among students: Prevalence and psychological problems in Japan. *JMAJ*. 2006;49:279-83.
18. Silva S. Quase três quartos dos jovens têm sinais de dependência da internet. *Jornal Público*. 2014 [accessed Juny 2016]. Available at: http://www.ispa.pt/ficheiros/noticias/03-11-2014_quase_tres_quartos_dos_jovens_tem_sinais_de_dependencia_da_internet_publico-web.pdf
19. Beutel, Brähler E, Glaesmer H, Kuss DJ, Wölfling K, Müller KW. Regular and problematic leisure-time internet use in the community: results from a German population-based survey. *Cyberpsychol Behav Soc Netw*. 2011;14:291-6.
20. Seo M, Kang, HS, Chae S. Emotional competence and online game use in adolescents. *Comput Inform Nurs*. 2012;30:640-6.