



## Frequency is not enough: Patterns of use associated with risk of Internet addiction in Portuguese adolescents



Pedro S. Gamito <sup>a, b, \*</sup>, Diogo G. Morais <sup>a, b</sup>, Jorge G. Oliveira <sup>a, b</sup>, Rodrigo Brito <sup>a, b</sup>, Pedro J. Rosa <sup>a, b, e</sup>, Margarida Gaspar de Matos <sup>c, d</sup>

<sup>a</sup> COPELABS, Universidade Lusófona, Portugal

<sup>b</sup> School of Psychology and Life Sciences, Universidade Lusófona, Portugal

<sup>c</sup> FMH & ISAMB, Universidade de Lisboa, Portugal

<sup>d</sup> WJRC/ISPA & Aventura Social Project, Portugal

<sup>e</sup> GIINCO – Grupo Internacional de Investigación Neuro-Conductual, Barranquilla, Colombia

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### ABSTRACT

This paper reports an exploratory analysis of the relation between Internet addiction and patterns of use among Portuguese adolescents ( $n = 2617$ ) from the WHO 2010 Health Behavior in School-aged children study, with a short version of Young's Internet Addiction Test (the brief Internet Addiction Questionnaire – bIAQ) and self-reports on online behaviors and access. Two-Step Cluster analysis identified two clusters of users based on their usage pattern: a minority of high-frequency users, with higher bIAQ scores, and a majority of low-frequency users, with lower bIAQ scores. Low and high-frequency users are particularly distinct in specific activities, which converges with previous research showing addiction to specific Internet activities rather than to the Internet as a whole.

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## 1. Introduction

The flip side of the growing ubiquity of the Internet in people's lives over the past couple of decades is the emergence of behavioral patterns suggesting psychological dependency on the Internet, often called Internet addiction (IA; Chen, Weng, Su, Wu, Yang, 2003; Gámez-Guadix, 2014; Griffiths, 1996; Koronczai et al., 2011; Young, 1998; for reviews, see Douglas et al., 2008; and Kuss, Griffiths, Karila, & Billieux, 2014). Whether these patterns can be actually classified as an addiction is still a matter of debate. Indeed, they are often referred to as, e.g., compulsive computer use (Black, Belsare, & Schlosser, 1999) or compulsive Internet use (Meerkerk, Van Den Eijnden, Vermulst, & Garretsen, 2009), pathological Internet use (Morahan-Martin & Schumacher, 2000), and problematic Internet use (Caplan, 2002; Yellowlees & Marks, 2007). Indeed, some argue that rather than treating excessive Internet use as a specific addiction to be diagnosed, research should focus on identifying personal and contextual factors that lead to excessive

use of the Internet as a behavioral syndrome (Van Rooij & Prause, 2014). Furthermore, in some views, Internet-focused addictive behavior is specific to certain behaviors for which the Internet is merely an accessible medium (Davis, 2001), such as gaming (Griffiths, Kuss, & King, 2012; Liu & Peng, 2009), and porn (Young, 2008). Here we present a study that explores the relation between patterns of specific forms of Internet use and Internet-related addictive symptoms among Portuguese adolescents.

### 1.1. Internet addiction

Three models of Internet addiction have been particularly influential (Van Rooij & Prause, 2014): Griffiths (2005) components model, Young's Internet Addiction Test (1998), and Tao and colleagues' diagnostic criteria for Internet addiction (Tao et al., 2010). These three models have a lot in common, mostly because they are all based on models of other behavioral addictions not involving substance use, such as the gambling addiction criteria included in the DSM-IV: salience (thinking about the activity); negative mood management, tolerance (need to increase use just to maintain pleasure), withdrawal (e.g. irritability and negative mood associated to lack of use), negative impact on other (in particular social) activities, relapse and lack of control over Internet activity. The IAT

\* Corresponding author. Universidade Lusófona de Humanidades e Tecnologias, Cognitive and People-centric Computing Laboratories, School of Psychology and Life Sciences, Campo Grande, 376, 1749 – 024 Lisbon, Portugal.

E-mail address: [pedro.gamito@ulusofona.pt](mailto:pedro.gamito@ulusofona.pt) (P.S. Gamito).

and diagnostic criteria models also include craving, and the IAT further includes lying about the activity, as aspects of Internet addiction. Another model also includes a refusal to admit that a problem exists (Alavi et al., 2012), but this is problematic to measure, as it assumes that a problem *does indeed* exist.

Conversely, many of the patterns of Internet addiction do not seem particularly focused on the Internet alone, but are correlated with other mental disorders, such as depressive individual factors. Accordingly, some researchers prefer to define IA as an emergent behavioral disorder, which can be associated with a variety of other psychiatric disorders, rather than a specifically distinct addiction (e.g. Van Rooij & Prause, 2014). IA has been associated with substance abuse (Yen, Ko, Yen, Chen, & Chen, 2009); to attention-deficit, but not hyperactivity, disorder (Yılmaz, Hergüner, Bilgiç, & Işık, 2015); and to depression, hostility, and social anxiety disorder (Bozkurt, Coskun, Ayaydin, Adak, & Zoroglu, 2013; Lee & Stapinski, 2012; Lim et al., 2015). The relationship between IA and depression has also found to be mediated by negative life events (Yang et al., 2014). All this suggests that IA is a symptom of more general problems rather than simply an effect, and that treatment of other psychological and psychiatric disorders offers some buffer against IA (Ko, Yen, Yen, Chen, & Chen, 2012).

Like other forms of dependencies, whether substance-related or not, dependencies on Internet-based activities are related to the pursuit of gratification. People seek go online seeking virtual community, information, thrills, aesthetic experience, monetary compensation, diversion, personal status and relationship maintenance (Song, LaRose, Eastin, & Lin, 2004). The pursuit of all these forms of gratification online, where they are reachable literally at one's fingertips, can thus easily lead to loss of control over Internet use. However, the specific purpose for which the Internet is used can also related to the probability of showing symptoms of dependence. A study in Lebanon found that the higher the self-reported risk of addiction, the less the Internet was accessed for information and research, and the more it was used for entertainment (Hawi, 2012).

In sum, a diversity of uses of the Internet can lead to risk of overuse and addictive symptoms, which some researchers define as an addiction, and others as an emergent behavioral disorder not particularly focused either on Internet use as such, but which finds an outlet in Internet-based activities. However, what is not yet well known is which Internet-based activities and patterns of use are more associated with the symptoms of addiction that are defined by some researchers as 'Internet addiction'.

## 1.2. Study overview

The current study explores the association between Portuguese adolescents' Internet use and their risk of developing Internet addiction. Early studies targeted undergraduates because at the time Internet access was most prevalent on campuses; however, the currently ubiquity of access makes adolescents the most vulnerable group (Ha et al., 2007). Our main goals were to uncover specific patterns of adolescent Internet use, on the one hand, and their association to Internet addiction, on the other hand. The data were collected as part of a larger 2010 survey study on young people's health behaviors (see Section 2), and included the brief Internet Addiction Questionnaire (bIAQ), a short measure of Internet addiction that we developed based on Young's (1998) Internet Addiction Test, as well as a small number of self-report measures of Internet behaviors. We first analyzed the reliability of the bIAQ measure, and next its association with patterns of Internet use (services and place of access), via cluster analysis. Finally, we analyzed the usefulness of the bIAQ in distinguishing between different types of Internet users. This approach allows us

to explore the interrelations of the diverse aspects of Internet addiction and behaviors, with the underlying goal of revealing the behavioral patterns that may underlie Internet addiction.

## 2. Methods

### 2.1. Participants and procedure

2617 secondary school students from the 2010 wave of the Portuguese Health Behaviour in School-aged Children (HBSC) survey (Matos et al., 2011) participated in this specific study, in which were introduced 9 items measuring Internet addiction and 8 items on frequency of different types of Internet use. The HBSC is a large cross-national collaborative study of the World Health Organization (WHO) Regional Office for Europe (for a description of the program, see Currie, Roberts, Morgan, & Smith, 2004). The survey runs once every four years in more than 40 different countries, and in Portugal it has been conducted since 1998. The Internet-related measures were developed and used for the Portuguese study only. Schools and classrooms were randomly selected from the official national list, stratified by the 5 Educational regions. The Portuguese sub-sample for the 2010 edition in which Internet items were introduced included students from the 8th ( $n = 1217$ ; 46.5%) and 10th grade ( $n = 1400$ ; 53.5%), ranging in age from 12 to 17yrs ( $Mage = 15yrs$ ;  $SDage = 1.12yrs$ ;  $female n = 1442$ , 55.1%), and is representative of Portuguese 8th and 10th grade students attending state-run schools. The survey was administered during the month of January 2010 in classrooms, during class time, by teachers who had received appropriate training. All head-teachers gave their consent, and written informed consent was previously obtained from both the students and their parents/legal guardians. No refusal was registered. The study was approved by a national ethics committee.

### 2.2. Measures

#### 2.2.1. Brief Internet Addiction Questionnaire

In order to understand the relation of IA both to behaviors and to other mental disorders, diverse screening instruments have been developed. The most widely used is Young's Internet Addiction Test (IAT; Young, 1998). It is based on the DSM-IV's criteria for pathological gambling, and consists of 20 questions on characteristic addictive behaviors, adapted to Internet use. Although three studies of the internal consistency of the IAT have identified more than one factor – either six factors (Widyanto & McMurrin, 2004) or three (Chang & Law, 2008; Widyanto, Griffiths, & Brunnsden, 2011) – most studies have found the IAT to have a good internal reliability as a single-dimension measure of Internet addiction (Jelenchick, Becker, & Moreno, 2012; Khazaal et al., 2008; Korkeila, Kaarlas, Jaaskelainen, Vahlberg, & Taiminen, 2010; Milani, Osualdella, & Di Blasio, 2009), including in Portugal (Pontes, Patrão, & Griffiths, 2014).

To construct the bIAQ scale, we included eight items from Young's Internet Addiction Test (IAT, Young, 1998). We also added one item tapping use of digital media to solve interpersonal problems in order to evade the anxiety of face-to-face encounters (Lee & Stapinski, 2012). We call this bIAQ scale a 'questionnaire' rather than 'test' because its purpose is for use in large-scale questionnaires rather than as a clinical diagnostic tool. Participants were asked to report the extent (1 – rarely; 2 – occasionally; 3 – frequently; 4 – often; 5 – always) to which they felt or behaved in certain ways due to their use of the Internet (see Table 1). We excluded 12 items from the IAT, either for lack of facial validity or for lack of applicability to teenagers, and others due to redundancy with items with better facial validity. In Table 2 we present the logic of exclusion of each of these items. Note that two of the excluded items have meanwhile been found to have low correlations with

**Table 1**  
bIAQ items ('labels' – dimensions measured) – descriptive analysis.

	M	SD
Do you form new relationships with fellow online users? ('new relations' – avoidance of face-to-face encounters)	2.08	1.27
Do close others in your life complain to you about the amount of time you spend online? ('excess time')	2.17	1.28
Do your school grades suffer because of the amount of time you spend online? ('schoolwork suffers' – negative consequences/personal)	1.86	1.18
Do you feel that life without the Internet would be boring, empty and joyless? ('joyless life offline' – negative mood management)	2.73	1.43
Do you lose sleep due to late night log-ins? ('lose sleep' – negative consequences/personal)	1.81	1.22
Do you choose to spend more time online over going out with friends? ('neglect friendships' – negative consequences/social)	1.79	1.19
Do you snap, yell, or act annoyed if someone bothers you while you are online? ('reactive if interrupted online' – negative consequences/social)	1.92	1.17
Do you feel depressed, moody, or nervous when you are offline, which goes away once you are back online? ('nervous offline' – withdrawal)	1.74	1.14
Do you use the Internet or SMS to answer provocations which you were unable to deal with at school? <sup>a</sup> ('answer provocations' – avoidance of face-to-face encounters)	1.64	1.14

<sup>a</sup> New item taps use of internet to evade social anxiety in face-to-face encounters. All other items adapted from the IAT.

**Table 2**  
IAT items excluded from the bIAQ.

Item	Analysis of meaning and facial validity/applicability
Do you find you stay online longer than you intended?	Indicates lack of control and excessive use. Item 'excess time' measures this more indirectly/unobtrusively
Do you find yourself saying "just a few more minutes" when on-line?	Idem
Do you prefer the excitement of the Internet to intimacy with your partner?	Indicates neglect of personal relations. Not applicable to participants without partners. Pontes et al. (2014) found unacceptably low factor loadings.
Do you check your email before something else that you need to do?	Outdated, as email not any more main source of interpersonal communication online. Not validated by Pontes et al. (2014).
Do you neglect household chores to spend more time online?	Indicates excessive use. Less applicable to teenagers than to adults
Do you block out disturbing thoughts about your life with soothing thoughts of the Internet?	Indicates cognitive salience or escapism. Face validity problem, as the Internet itself is not the main object of thoughts – these usually focus on specific contents or usage
Do you feel preoccupied with the Internet when offline, or fantasize about being online?	Idem
Do you find yourself anticipating when you go online again?	Idem
Do you become defensive or secretive when anyone asks you what you do online?	Ps probably interpret as shameful content rather than excessive use
Do you try to hide how long you've been online	Depends on others' varied normative ideas.

the other IAT items in a recent IAT validation study in Portugal by Pontes et al. (2014). We also included an additional item on use of the Internet to mediate social relations, because a recent study shows that preference for online communication is related to social anxiety and face-to-face avoidance, and also to PIU (Lee & Stapinski, 2012).

### 2.2.2. Frequency of type of Internet use and of location of Internet access

Participants were asked to report how frequently they used different types of Internet features, such as email, social networks, online gaming, or blogs, and where they get access to the Internet using a 6-point Likert scale (1 – never; 2 – once a week; 3 – two or three times a week; 4 – between four and six times a week; 5 – every day; 6 – several times a day) (see Table 3).

## 3. Results

### 3.1. Data analysis strategy

We first tested the uni-dimensional structure of the proposed bIAQ measure with a Confirmatory Factor Analysis (CFA). The following indices-of-fit are reported: the Tucker–Lewis Index (TLI, also known as the Non-Normed Fit Index), the Comparison Fit Index (CFI), the Goodness-of-Fit Index (GFI) and the Root Mean Square Error of Approximation (RMSEA). For each of the first three indices, values range from 0 to 1.0, and values over .9 are considered acceptable. For the RMSEA index, values lower than .05 indicate an ideal fit and lower than .08 indicate a reasonable fit. The chi-square statistic was not considered as it is quite sensitive to sample size.

We then analyzed the patterns of Internet usage with a 2-step cluster analysis, in order to uncover types of users based on their

Internet activities. Cluster analysis is a powerful data mining technique and a convenient method for grouping individual actions into patterns of behavior by determining which responses co-occurred (Romero, González, Ventura, del Jesus, & Herrera, 2009; Rosa, Morais, Gamito, Oliveira, & Saraiva, in press). We chose a Two-Step Clustering method due to its efficacy in analyzing large datasets by automatically determining the optimal number of clusters (Zhang, Ramakrishnan, & Livny, 1996). The log-likelihood distance measure was applied for clustering and the Schwarz's Bayesian Criterion (BIC) was used for the selection of the optimal number of clusters. A noise handling of 30% was used as criterion for outlier removal (Cross, 2013). Finally, we tested the difference in bIAQ scores between the clusters found. Descriptive analyses and means comparisons, as well as EFA, were conducted on IBM-SPSS 22. CFA was run on AMOS and receiver operating characteristic (ROC) analyses were performed via MedCalc version 15 (MedCalc Software, Mariakerke, Belgium). ROC analysis was performed in order to obtain a cut-off score for best discriminating clusters. The optimal criterion for cut-off point selection used was the maximum value of the Youden index defined as:  $J = \max [\text{sensitivity } c + \text{specificity } c - 1]$  where  $c$  ranges over all possible criterion values (Youden, 1950). The Area Under Curve (AUC) was tested using the DeLong's nonparametric approach (DeLong, DeLong, & Clarke-Pearson, 1988).

### 3.2. Structure and reliability of the bIAQ

We started by looking at the inter-correlations between the 9 items. Bivariate correlations were all positive and significant, ranging from  $r = .31$  to  $r = .68$  (i.e., moderate to strong; mean inter-item correlation,  $r = .52$ ). We then ran exploratory principal components analyses (PCA) with oblimin rotations (appropriate to uncover correlated factors, which would be expected given these

**Table 3**  
Frequency of Internet use and place of Internet access – descriptive analysis.

Usage	M	SD
Email	4.33	1.36
Search engines	4.46	1.21
Social networks	3.84	1.67
Blogs	2.48	1.67
Forums	2.55	1.73
Online games	2.86	1.81
Use multimedia content	4.21	1.43
Create multimedia content	2.94	1.75
Place of Internet access		
Frequency of internet use in your home, in your own bedroom	3.90	1.79
Frequency of internet use in your home, in the living room	3.16	1.81
Frequency of internet use in your school	1.97	1.28
Frequency of internet use in the homes of family members or friends	2.09	1.34
Frequency of internet use In public places	1.68	1.25

Note: The frequency of use for each of these online activities was measured in a 5 point scale: 1 – Never; 2 – once a week; 3 – two or three times a week; 4 – four to six times a week; 5 – everyday; 6 – several times a day.

**Table 4**  
Structure of bIAQ: CFA single-factor item loadings, item–total correlations, inter-item-correlations.

Items (loadings in CFA)	CFA	Item-total	1.	2.	3.	4.	5.	6.	7.	8.
1. New relations	.57	.57								
2. Excess time	.64	.67	.50							
3. Schoolwork suffers	.75	.72	.44	.59						
4. Life offline joyless	.52	.52	.36	.44	.39					
5. Lose sleep	.79	.74	.45	.51	.63	.43				
6. Neglect friendships	.79	.73	.44	.50	.56	.43	.62			
7. Reactive if interrupted online	.80	.74	.45	.54	.59	.41	.62	.63		
8. Moody offline	.84	.78	.48	.54	.63	.44	.65	.68	.68	
9. Answer provocations <sup>a</sup>	.70	.64	.43	.41	.53	.31	.57	.56	.56	.60

<sup>a</sup> New item. All other items were adapted from the IAT.

correlations), with the conventional criterion of eigenvalue > 1 to accept factors. This analysis resulted in a single-factor solution. The total bIAQ score was calculated based on the average of all 9 items, ranging from 1 to 5.

The results of the CFA indicate an excellent fit of the data to a one-factor solution for the bIAQ (TLI = .984; GFI = .987; CFI = .990; RMSEA = .045, 90% CI [.038, .052]). A reliability analysis for the use of bIAQ as a single-dimensional scale indicates a very good consistency ( $\alpha = .906$ ), with all item–total correlations > .50, as recommended by Netemeyer, Bearden, and Sharma (2003). Table 4 summarizes the inter-item correlations, item–total correlations, and CFA loadings on the single component for each item.

### 3.3. Internet usage patterns and Internet addiction

We entered into a cluster analysis thirteen variables: 8 related with the time spent on different Internet activities (e.g. “How much time do you spend a week on social networks”, “How much time do you spend a week on blogs”) and 5 linked to the places of Internet access. Two clusters were found: 15.7% ( $n = 290$ ) of the records were assigned to the first cluster and 84.3% ( $n = 1559$ ) to the second, with a ratio of sizes of 5.37. According to Kaufman and Rousseeuw (1990), the overall model quality is “Fair” with an average silhouette of .3.<sup>1</sup>

Based on cluster comparison, as depicted in Fig. 1, Internet users in cluster 1 performed Internet activities more frequently (several times per day) than those in cluster 2 regardless of the nature of the

activity, and also had higher scores on the bIAQ. Users in cluster 1 had greater access to the Internet at home (living room and bedroom), but had similar access outside of the home (public places, school, home of family members) to that of users in cluster 2, as they had the same modal category. Internet users in cluster 2 presented a different pattern, reporting less Internet activities, with occasional use, and had lower scores on the bIAQ.

The frequency of use of social networks and email and the consumption of multimedia contents were the most important predictors of cluster membership, that is, they differentiated quite well between the two clusters found (see Fig. 1: please note that cluster concentration on modal values is more important than difference in mode between clusters). In order to examine potential differences in bIAQ scores between these two clusters, we created a cluster membership variable and performed a 2 independent sample t-test<sup>2</sup> based on membership values. The results of Welch’s t-test showed higher bIAQ scores ( $M = 2.68$ , 95% CI [2.54, 2.81]) in cluster 1 (frequent Internet users) than in cluster 2 (occasional Internet users) ( $M = 1.66$ , 95% CI [1.62, 1.68]),  $t(327.39) = 14.42$ ,  $p < .001$ , 95% CI [.88, 1.16],  $d = 1.06$ .

As the bIAQ varies significantly between clusters, ROC analysis was performed in order to obtain a cut-off score for best discriminating clusters. As depicted in Fig. 2, the bIAQ AUC for detection of frequent Internet users was .78 ( $Z = 18.19$ ,  $p < .001$ , 95% CI [.76; .80]), which reveals a moderate accuracy, above the desirable level (>.75) (Larner, 2015). Moreover, the best cut-off value of bIAQ to detect users with frequent Internet usage was >1.77 (Youden’s

<sup>1</sup> The silhouette measure of cohesion and separation averages, over all internet users,  $(B-A)/\max(A,B)$ , where A is the user’s distance to its cluster center and B is the user’s distance to the nearest cluster center that it does not belong to). A silhouette coefficient of 1 would mean that all cases are located directly on their cluster centers (Kaufman & Rousseeuw, 1990).

<sup>2</sup> As the assumptions of normality and homoscedasticity were not met, we used the strategy of computing both the independent-test and its equivalent non-parametric test (Mann–Whitney, as recommended by Fife-Schaw, 2006). As the conclusions drawn from both tests were similar, we opted for presenting the t-test results, as these are more robust, reducing the probability of Type I error.

### Cluster Comparison

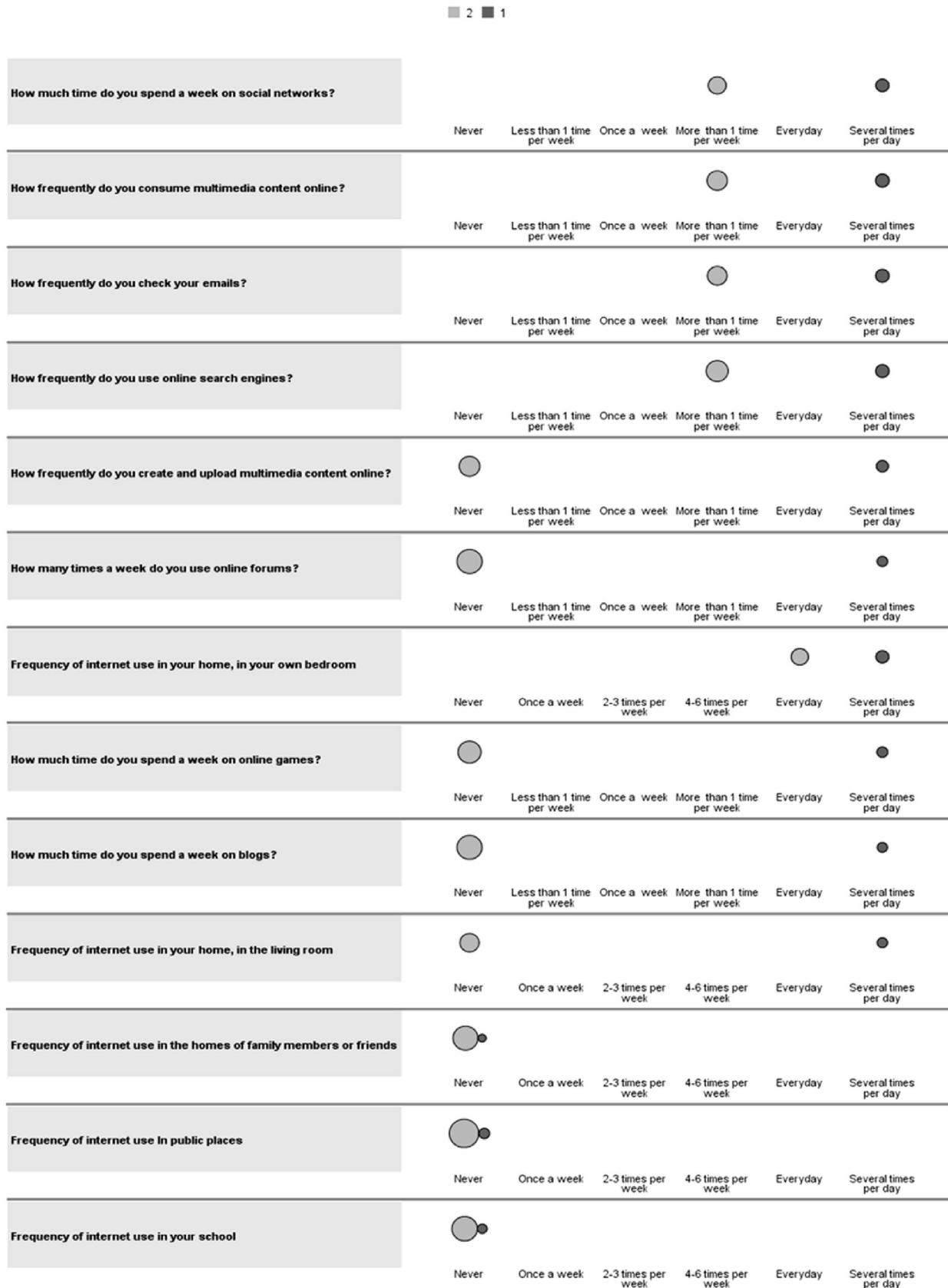


Fig. 1. Cluster comparison for input variables. Dot size represents the percentage of users in the modal category. Note that input variables are sorted in descending order by prediction importance in estimating the model.

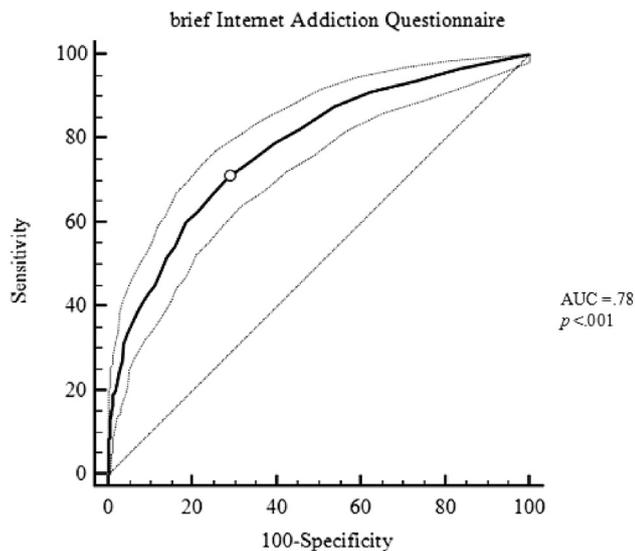


Fig. 2. ROC curve for detection of frequent Internet users ( $n = 1848$ ). The dot represents the Youden Index.

$J = .42$ ), with a sensitivity of 71.3% and a specificity of 71.4%.

#### 4. Discussion

In this study, we were interested in exploring relations between patterns of Internet usage and Internet addiction among adolescents. We developed a short measure of Internet addiction – the brief Internet Addiction Questionnaire (bIAQ) – based on Young's Internet Addiction Test, as well as measures of Internet usage (frequency of different types of usage and of different types of settings of Internet access), as part of a larger study on Portuguese teenagers health behaviors, the 2010 HBS study. This bIAQ measure showed excellent internal reliability, in particular considering that it is a short measure and reliability analyses are sensitive to number of items. It should be noted, however, that the bIAQ scale was not designed nor should it be used for clinical diagnosis of Internet addiction in individual patients. Rather, it is a measure useful for large-scale surveys with multiple measures, such as this one. Indeed, screening tests in general are not suitable for clinical diagnostic purposes because of their low predictive value, which results in high rates of false positives in the case of disorders with low prevalence rates (Maraz, Király, & Demetrovics, 2015).

We explored participants' use of the Internet with cluster analysis, and uncovered two clusters, a smaller one of *high-frequency* users, that is, of participants who reported using the Internet more frequently in every domain, and a larger one of *low-frequency* users, who reported using the Internet less frequently. A small number of items made the most contribution to the distinction between these two clusters: high-frequency users, on average, had greater home access to the Internet, and engaged on average very frequently in all types of use of the Internet, whereas low-frequency users engaged moderately in the use of social networks, search engines, and consumption of multimedia, and very little in blogs, forums, online gaming, and production of multimedia, as well as having less home access to the Internet.

We also confirmed the association of Internet addiction to patterns of use of the Internet: high-frequency users had significantly higher average scores on the bIAQ than low-frequency users. Together, these results suggest that there is a common use of the Internet in which almost all youngsters engaged (including media consumption, social networking, and information seeking) and which does not necessarily entail the risk of Internet addiction, and there is a specific high-

frequency use in which a minority of youngsters engaged, which includes the common use, but with greater frequency than do other users, as well as a usage with a more active role, such as blogs and online gaming, and which does entail the risk of Internet addiction. Indeed, considering the verbal anchors of the items in the bIAQ (which are the same as those used in the IAT), the mean scores of high-frequency users approximate a situation of risk of addiction, whereas those of low-frequency users do not.

This suggests that these two patterns of Internet use – high and low frequency – may be distinct not only behaviorally, but also psychologically, in their association to a risk of Internet addiction. That is, it is possible that users assign different psychological meaning to each of these patterns of use – and that only the latter is psychologically addictive, whereas the former meshes seamlessly with daily life. This echoes with other recent findings that show that, for instance, problematic online gaming is not only conceptually, but empirically distinct from general problematic Internet use, as well as less prevalent than the latter (Király et al., 2014), and that video game addiction offline and online are actually indistinguishable, and separate from general Internet addiction, which can in particular in the case of females be almost exclusively related to addiction to social networks (Rehbein & Mößle, 2013).

Both our results and those of other researchers should be approached with a specific caution: the Internet is changing fast. In particular, increased connectivity and the widespread expansion of smart-phone use means that there is a fast-growing section of the population that has permanent access to the Internet. The proportion of the population that has access to the Internet in general is also continuously expanding. It is to be expected that proportions of the more high-frequency active users would have expanded since 2010, when the survey in which this study was integrated was carried out, in particular among teenagers, which are the most connected age group in Portugal. On the other hand, the pattern of most common uses of the Internet (i.e. for the majority of users) appears to still be current: in Portugal, despite an overall growth of Internet among the population, the relative importance of different online activities remains roughly the same: Google (search engine), Facebook (social networking), and YouTube (media content) are the three sites with most visits (Damásio, Henriques, Teixeira-Botelho, & Dias, 2013).

However, the more general point, which converges with the results of other recent studies (e.g. Kuss, Griffiths, & Binder, 2013), is that some types of Internet use can be related to a risk of addiction, and others not, which suggests that the object of addiction is not the Internet as a whole, but rather what one does on the Internet (Király et al., 2014; Rehbein & Mößle, 2013). As suggested by Van Rooij and Prause (2014), it could very well be that some specific online behaviors follow addictive patterns, whereas most others do not. Studies on the risk of Internet addiction or addiction to certain behaviors online will continue to need to address the evolving nature of patterns of Internet use (e.g. gaming, porn, social networking, multimedia platform, information) and of their relation to addiction. The results reported here provide further support to the idea that simple frequency of use may not be a good indicator of addiction or risk of addiction. Rather, specific types of use involving greater active engagement with the medium and its use in creating and sustaining an online social life separate from face-to-face social contact may be responsible for these phenomena. The fact that 'social networks' appears in the 'common use' dimension should not detract from this, as these networks are often used as extensions of offline relations and multimedia platforms. This idea, however, requires further testing. Indeed, the present study merely points out the need to understand better how patterns of Internet use are related to addiction and risk of addiction to the Internet. More research is needed, and multi-methods

approaches with clinical interviews, survey studies, and automatically generated Internet use data should provide better converging evidence to clarify the relation between Internet addiction and use.

However, the findings reported here do offer clear support to the idea that specific uses of the Internet, rather than simply time spent online, are particularly addictive. They add to a growing body of evidence pointing in this direction, and which should have a considerable impact on the formulation of health and education policies, as well as on guidelines for parental monitoring. The main thrust of this impact is that we should worry less about how much teenagers are online, and start asking what exactly they are doing online.

## Conflicts of interest

None declared.

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