

Problematic Internet and cell phone use in Spanish teenagers and young students

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Título: Uso problemático de Internet y móvil en adolescentes y jóvenes españoles.

Resumen: Las adicciones a las Tecnologías de la Información y de la Comunicación han devenido una importante área de investigación. Los objetivos del estudio fueron caracterizar el posible uso problemático de Internet y móvil y analizar la capacidad predictiva de estos usos problemáticos para explicar las puntuaciones en el Cuestionario de Experiencias Relacionadas con Internet (CERI) y en el Cuestionario de Experiencias Relacionadas con el Móvil (CERM). Se aplicaron tres cuestionarios a 1.879 estudiantes: un cuestionario general sobre uso de Internet y de móvil, un cuestionario sobre uso problemático de Internet (CERI) y otro sobre móvil (CERM). El clúster ofreció una solución de tres grupos tanto para el CERI como para el CERM: sin problemas, problemas ocasionales y problemas frecuentes. No se encontraron diferencias entre hombres y mujeres en Internet pero había más mujeres en el grupo de problemas frecuentes con el móvil. La comparación con nueve estudios españoles sugiere que: a) el tiempo conectado no es por sí sólo un buen indicador de uso problemático; b) emerge la relación entre uso problemático de Internet y malestar psicológico; c) el factor que puede explicar este uso problemático son las comunicaciones alteradas de identidad que ocurren al esconder la verdadera identidad; y d) las encuestas poblacionales no permiten confirmar la existencia de un trastorno adictivo persistente asociado a las TIC.

Palabras clave: Adicción a Internet; Adicción al teléfono móvil, Adolescentes; Adultos jóvenes; Tecnologías de la Información y de la Comunicación (TIC).

Abstract: Addiction to the Information and Communication Technologies (ICT) has become an important research topic. The aims of the present study were to determine the problematic uses of Internet and cell phones in Spanish teenagers and young students and analyze the predictive capacity of these problematic uses to explain scores on the CERI (Cuestionario de Experiencias Relacionadas con Internet) and CERM (Cuestionario de Experiencias Relacionadas con el Móvil). Three questionnaires were applied to 1,879 students: a general questionnaire for Internet and cell phone use, one scale for problematic use of Internet (CERI) and one for cell phone (CERM). Cluster analysis yielded a solution involving three groups for both CERI and for CERM: no problems, occasional problems and frequent problems. There were no differences between males and females in Internet but there were more females showing frequent problematic use of cell phone. A comparison with nine previous Spanish studies suggests that: a) the amount of time spent connected is not a good indicator of problems deriving from its use; b) the factor that could explain problematic use is altered identity communication (AIC), which occurs when users hide or alter their true identity; and c) population survey data alone do not allow to confirm the existence of a persistent addictive disorder related to ICT.

Key words: Internet addiction; Mobile phone addiction, Teenagers, Young adults, Information and Communication Technology (ICT).

Introduction

Ever since Goldberg's (1995) DSM parody about addiction to Internet, and Young presented her paper *Internet Addiction: The Emergence of a New Disorder* at the congress of the *American Psychological Association* held in Toronto in 1996, the topic has been discussed at length in the mass media and scientific literature (Carbonell, Guardiola, Beranuy & Belles, 2009). Interest in the possibility of addiction to videogames, online role-playing games, television and cell phones has given rise to a new field of study, that of addiction to Information and Communications Technologies (ICT) or as Griffiths (1995) coined them, 'technological addictions'.

During the last fifteen years, one of the topics that has interested researchers most has been to determine the distribution, frequency and causes of addiction to ICT, particularly Internet, and especially in young people (for a review of these topics, see Echeburua, Labrador and Becoña, 2009; Sánchez-Carbonell, Beranuy, Castellana, Chamarro and Oberst, 2008; Widyanto & Griffiths, 2009). Since 2002, nine Spanish studies have focused on Internet addiction including four that have also studied addiction to cell phones, thus making Spain a very productive European country on this

topic, and allowing certain conclusions to be drawn about addiction to ICT in Spain. Table 1 summarizes four aspects of these studies: (i) authors and year of study, (ii) type of ICT studied, (iii) sample size, gender and age, and (iv) instruments and main findings. All of them were population surveys among secondary and/or university students, and used a variety of instruments to measure: a) addiction/abuse of Internet and or cell phone; and b) personality dimensions and psychopathology symptoms. These studies used a variety of instruments to measure Internet or cell phone addiction/abuse with questionnaires centered on uses and time invested.

Additionally, most of them were descriptive in nature (Chóliz, Villanueva & Chóliz, 2009; Estevez, Bayón, De la Cruz & Fernández-Liria, 2009; Labrador & Villadangos, 2010; Muñoz-Rivas, Navarro & Ortega, 2003), and when relationships were analysed, personality dimensions and psychopathological symptoms were the outcomes (Jenaro, Flores, Gómez-Vela, González-Gil & Caballo, 2007; Muñoz-Rivas, Fernández & Gámez-Guadix, 2010). Consequently, addiction/abuse instruments validated with Spanish population and studies dedicated to the analysis of its correlates are still necessary.

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Table 1. Summary of Spanish studies on problematic ICT usage among teenagers and young students.

| Authors and year of study | Type(s) of ICT studied | Sample size, gender breakdown and age (where known) | Instruments and main findings |
|---|--------------------------|--|--|
| Viñas, Juan, Villar, Caparros, Pérez & Cornella (2002) | Internet | 1,277 Girona University students 64.1% female, 35.9 % male | <i>Instruments:</i> BDI (Beck Depression Inventory); BHS (Beck Hopelessness Scale); SCL-90 (Symptom Checklist); general information questionnaire. <i>Main findings:</i> Positive correlation between Internet use (mainly chat) and various psychopathological indicators (depression, anxiety and sleep alterations). 5% of students report Internet use for more than one hour per day. Use of Internet chat associated with more psychological malaise, greater dissatisfaction in relationships with family, with a partner, and particularly in capacity or ability to maintain social relations. |
| Muñoz-Rivas, Navarro & Ortega (2003) | Internet | 1,301 San Pablo-CEU and UCM students 71.3% female, 28.7% male Mean age: 20.4 years | <i>Instruments:</i> Questionnaire with 19 categorical items and 69 dichotomous items (true/false) to explore patterns of Internet use and abuse. <i>Main findings:</i> Boys used Internet more than girls. Connection times of over 20 hours per week were reported by 3.7% and 17% perceived Internet interfered in daily lives: 11% neglected obligations, 3.6% reported family problems, 2.4% reported academic and/or occupational performance problems, and 0.2% lost friends. |
| Jenaro, Flores, Caballo, González & Gómez (2007) | Internet and cell phones | 337 Salamanca University students 24% male, 72% female 93.5% Spaniards | <i>Instruments:</i> Internet Over-use Scale (IOS); Cell-Phone Over-use Scale (COS); BDI; Beck's BAI; General Health Questionnaire (GHQ-28). <i>Main findings:</i> 6.2% pathological internet users, 10.4% pathological cell phone use, and 3.9 pathological for both. No significant association between Internet or cell-phone over-use and substance abuse/dependency, and pathological gambling. Internet over-users more likely to experience additional psychiatric disorders such as insomnia, social dysfunction, depression, and anxiety. |
| García, Terol, Nieto, Lledó, Sánchez, Martín-Aragón & Sitges (2008) | Internet | 391 Miguel Hernández University students (Elche) 74% female, 26% male Mean age: 19.6 years | <i>Instruments:</i> Socio-demographic questionnaire; Social Expression Questionnaire: Motor EMES-M and Cognitive (EMES-C); Extroversion Personality Inventory (EPI); Internet Questionnaire; Internet Use and Abuse Questionnaire <i>Main findings:</i> Internet abuse not observed. Frequent Internet users more likely to abuse Internet. Heaviest users had the most "negative thoughts" that interfered in their social situations. |
| Beranuy, Oberst, Carbonell & Chamorro (2009) | Internet and cell phones | 365 Ramon Llull University students (Barcelona) 75.1% female, 24.9% male Mean age: 21.37 years | <i>Instruments:</i> Questionnaire on Internet-related experiences (CERI); Questionnaire on Cell phone-related experiences (CERM); Trait Meta-Mood Scale (TMMS-24); Symptom Checklist-90-R (SCL-90-R) <i>Main findings:</i> Psychological distress related to maladaptive use of both the Internet and the mobile phone; females scored higher than males on the mobile phone questionnaire, showing more negative consequences of its maladaptive use. The components of Perceived Emotional Intelligence contributed to the explanation of the variance of the general indicators of psychological distress, but to a lesser degree than maladaptive use of Internet and mobile phone. |
| Chóliz, Villanueva & Chóliz (2009) | Cell phones | 1,944 Valencian teenagers aged 12 to 18 years 51% female, 49% male | <i>Instruments:</i> Socio-demographic and school performance data; Basic parameters on cell phone use; Scale of cell phone functions; Image of cell phone; Problems deriving from expenditure <i>Main findings:</i> Girls sent more text-messages, made more "lost" calls, and generally spent more time using their cell phones than boys. No differences observed in voice calls. Girls used cell-phone more as an inter-personal communication device and as a psychological tool to cope with bad/unpleasant moods. Boys used more of the phone's technological functions (i.e., games, Internet downloads, and connection to electronic devices). |
| Estévez, Bayón, de la Cruz & Fernández-Liria (2009) | Internet | 699 students aged 14 to 18 years from three schools in Madrid Autonomous Community (41% private, 27% public and 31% joint-funded). 51% female, 49% male | <i>Instruments:</i> Demographic characteristics; McOrman's Internet Addiction Test; Young's Internet Addiction Test; Questionnaire on most-used web services, consumption of tonic substances or practice of other addictive behaviours; General Health Questionnaire (GHQ-28); Temperament and Character Inventory (TCI-R) <i>Main findings:</i> McOrman's IAT [20% were at-risk users, 3.7% had problematic use; Young's IAT [43.3% were at-risk users and 3.3% problematic users]. Males used web-sites more, and females used electronic mail more. No differences in chat room use. Higher risk of problematic use was related to higher scores on four subscales of the GHQ. Problematic users had lower scores in the dimensions of self-direction and co-operation, and higher in novelty seeking. High proportion of possible psychiatric cases in the at-risk group and in those with problematic Internet use. |
| Labrador & Villadangos (2010) | Internet, cell phones, | 1,710 students from six schools in Madrid Autonomous Commu- | <i>Instruments:</i> Questionnaire for Detection of New Addictions (DENA) <i>Main findings:</i> ICT problems: Internet [5.7% females, 4.7% males]; videogames [0.3% females, 2.4% males]; cell phones [10.3% females, 6.2% males]; television [10.2% both |

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|--|---|--|
| television and video games | nity (one public, two private, three joint-funded). 41% female, 59% male. Mean age: 14.03 yrs, range 12 to 17 years | females and males]. Positive correlation observed between age and perception of problematic Internet and cell phone use, as well as between time spent using and perception of problems in use of ICT. |
| Muñoz-Rivas, Fernández & Gámez-Guadiz (2010) | Internet 1301 university students 71, 3% female | <i>Instruments:</i> Questionnaire with 19 categorical items and 69 dichotomous items (true/false) to explore patterns of Internet use and abuse: demographic characteristics, general and specific parameters of Internet use, reasons for using Internet, online social relationships, and indicators of pathological use. <i>Main findings:</i> 9.9% excessive users. The excessive use group were male, spends more time online, preferred to be online at night. Abusive connection behaviour reduces users emotional tension, some symptoms could be interpreted as tolerance, abstinence and loss of control, suggesting that the problems associated with excessive Internet use are similar to those of other behavioural and technological addictions. |

As a continuation of our previous research with the construction of CERI (Cuestionario de Experiencias Relacionadas con Internet) and CERM (Cuestionario de Experiencias Relacionadas con el Móvil) questionnaires (Beranuy, Chamarro, Graner, & Carbonell, 2009), there are two major goals in this study. First, to determine the problematic uses of Internet and cell phones in Spanish teenagers and young students, and second, in order to expand validity of CERI and CERM questionnaires, to analyze the predictive capacity of these problematic uses to explain scores on both the CERI and CERM.

Method

Participants

The sample comprised 1,879 students from Catalanian educational institutions (322 students of Ramon Llull University in Barcelona, studying psychology, education sciences, physical education sciences, speech therapy, nursing, physiotherapy, journalism or communications sciences), and 1,557 secondary school students. These secondary students participated in a study about how to prevent addiction to ICT in school using educational activities (see the pilot study by Carbonell, Graner and Quintero [2010]). The mean age of the overall sample comprising 45.5% males and 54.5% females was 15.5 years (SD = 2.43 years). All participants were users of both the Internet and cell phones (see Table 2).

Table 2. Age and sex of the 1.879 students.

| Age group | | Age | |
|----------------------------------|--------|--------------|---------------|
| | | Frequency | Mean (SD) |
| Pre-adolescents (12-14 years) | Total | 717 (38.2 %) | 13.31 (0.793) |
| | Male | 368 (51.3 %) | |
| | Female | 349 (48.7 %) | |
| Adolescents (15-17 years) | Total | 840 (44.7 %) | 15.80 (0.733) |
| | Male | 399 (47.5 %) | |
| | Female | 441 (52.5 %) | |
| Young (18-25 years) | Total | 322 (17.1 %) | 19.72 (1.739) |
| | Male | 88 (27.3 %) | |
| | Female | 234 (72.7 %) | |

Instruments

General questionnaire on use of Internet and cell phones. This comprised socio-demographic items, general questions about Internet use (frequency and duration of connection, time since start of use, and frequency of use of twenty specific applications), and general questions about cell phone use (amount of time as a user, and frequency of use of five applications).

Questionnaire on internet-related experiences (CERI - Cuestionario de Experiencias Relacionadas con Internet) developed by Beranuy, Chamarro, Graner and Carbonell (2009). The CERI consists of 10 Likert-type items with four responses in order of increasing intensity (with a minimum score of '1', and a maximum score of '4'). It has two factors: intrapersonal conflicts and interpersonal conflicts, and good reliability (Cronbach's alpha = .776) (see Appendix 1)

Questionnaire on cell phone related experiences (CERM - Cuestionario de Experiencias Relacionadas con el Móvil), developed by Beranuy, Chamarro, Graner and Carbonell (2009), also comprises 10 Likert-type items with four responses, scored '1' to '4', in increasing order of intensity. It has two factors: conflicts and communicative/emotional use, and good reliability (Cronbach's alpha = .805) (see Appendix 2).

Procedure: The questionnaires were administered to class groups in the presence of some of the researchers. Prior to administration of the questionnaires, the research team informed all participants about: (i) the aims of the study, (ii) participation being voluntary, and (iii) all data being confidential and anonymous. Administration times varied from approximately 30 to 50 minutes.

Data analysis: In order to obtain cut-off scores of the CERI and CERM questionnaires, a non-hierarchical cluster analysis (K-means) was carried out to determine the existence of homogenous groups of participants with respect to scores on the ten items in each questionnaire. To characterise those types of Internet and cell phone use related with abusive use of these technologies, first a one-way ANOVA for gender was conducted. In addition, a multiple regression analysis was conducted for uses relating to CERI and CERM scores, respectively.

Results

Cluster analysis yielded a solution involving three groups for both CERI ($F(2) = 3918.2; p < .001$) and for CERM ($F(2) = 3297.4; p < .001$). In the case of CERI, the first group, comprising 1,138 students (60.6% of the sample) with the lowest scores (from 10 to 17 points) was labelled 'NPI' (no problems with Internet use). The second group comprised 626 students (33.3%) with medium scores (from 18 to 25 points) and was labelled 'OPI' (occasional problems with Internet use). The third group comprised 115 students (6.1% of the sample) with the highest scores (from 26 to 40 points), and was labelled 'FPI' (frequent problems with Internet use) (see Table 3). There were no differences between males and females ($F=124 [1, 1877]; p > .05$), and the percentage of OPI and FPI were higher in the group aged 11 to 13 years, with an accused diminution when age is between 18 and 25 years ($F=36.68 [1,1877]; p < .001$).

Table 3. Distribution of the sample by type of Internet use (n=1,879)

| Clustering variable | | NPI* | OPI** | FPI*** |
|---------------------|-------------|--------------|-------------|------------|
| Age | 18-25 years | 251 (78%) | 64 (19.9%) | 7 (2.2%) |
| | 14-17 years | 499 (59.4%) | 292 (34.8%) | 49 (5.8%) |
| | 11-13 years | 388 (54.1%) | 270 (37.7%) | 59 (8.2%) |
| Gender | Male | 517 (60.5%) | 281 (32.9%) | 57 (6.7%) |
| | Female | 621 (60.6%) | 345 (33.7%) | 58 (5.7%) |
| Total | | 1138 (60.6%) | 626 (33.3%) | 115 (6.1%) |

* NPI: no internet problems; **OPI: occasional internet problems; **FPI: frequent internet problems.

For CERM, the first group comprised 1,510 students (80.4% of the sample) and corresponded to the lowest scores (10 to 15 points). This was labelled 'NPC' (no problems with cell phone use). The second group comprised 316 students (16.8%) with medium scores (16 to 23 points) and was labelled 'OPC' (occasional problems with cell phone use). The third group comprised 53 students (2.8% of the sample) with high scores (24 to 40 points) and was labelled 'FPC' (frequent problems with cell phone use) (see Table 4). There were differences in distribution between males and females, with more OPC for females ($F=33.73 [2, 1877]; p < .05$). There were no differences related to group age ($F=1.15 [2, 1877]; p > .05$).

Table 4. Distribution of the sample by type of cell phone use (n=1,879)

| Clustering variable | | NPC* | OPC** | FPC*** |
|---------------------|-------------|--------------|-------------|-----------|
| Age | 18-25 years | 270 (83.9%) | 49 (15.2%) | 3 (0.9%) |
| | 14-17 years | 676 (80.5%) | 146 (17.4%) | 18 (2.1%) |
| | 11-13 years | 564 (78.7%) | 121 (16.9%) | 32 (4.5%) |
| Gender | Male | 734 (85.8%) | 97 (11.3%) | 24 (2.8%) |
| | Female | 776 (75.8%) | 219 (21.4%) | 29 (2.8%) |
| Total | | 1510 (80.4%) | 316 (16.8%) | 53 (2.8%) |

* NPC: no problems with cell phone; **OPC: occasional problems with cell phone; **FPC: frequent problems with cell phone.

In relation to Internet uses, males reported a more intensive use than females, except for chat applications, information searches, and blogs (see Table 5). In relation to cell

phones, males reported more intensive usage than females except in text messages and calls (see Table 6)

Table 5. Comparison of Internet uses between males and females.

| Type of use | Gender | Mean (SD) | F |
|-------------------------------------|--------|--------------|----------|
| Messenger applications | Male | 3.25 (1.034) | 32.00** |
| | Female | 3.50 (0.917) | |
| Information searches | Male | 2.84 (0.985) | 26.66** |
| | Female | 3.07 (0.941) | |
| Peer-to-peer services | Male | 2.75 (1.250) | 4.49* |
| | Female | 2.63 (1.223) | |
| Sport/simulation games | Male | 2.08 (1.137) | 408.69** |
| | Female | 1.25 (0.597) | |
| Online publications | Male | 1.98 (1.066) | 3.68* |
| | Female | 1.88 (0.979) | |
| Real time role-playing games (TRG) | Male | 1.90 (1.135) | 267.14** |
| | Female | 1.23 (0.601) | |
| Arcade games | Male | 1.84 (1.069) | 224.19** |
| | Female | 1.25 (0.605) | |
| First Person Shooter (FPS) games | Male | 1.71 (1.073) | 290.74** |
| | Female | 1.09 (0.388) | |
| Pornographic/erotic websites | Male | 1.65 (0.953) | 323.57** |
| | Female | 1.07 (0.348) | |
| Internet purchases | Male | 1.29 (0.618) | 5.70* |
| | Female | 1.23 (0.531) | |
| Electronic mail | Male | 2.76 (1.001) | 29.78** |
| | Female | 3.01 (0.940) | |
| Chat applications | Male | 1.54 (0.856) | 6.58* |
| | Female | 1.45 (0.742) | |
| Forums | Male | 1.63 (0.925) | 19.72** |
| | Female | 1.45 (0.791) | |
| Banking facilities | Male | 1.23 (0.632) | 21.79** |
| | Female | 1.11 (0.454) | |
| Investment facilities | Male | 1.20 (0.601) | 61.92** |
| | Female | 1.04 (0.253) | |
| Betting or casino websites | Male | 1.19 (0.585) | 26.68** |
| | Female | 1.08 (0.387) | |
| Blogs | Male | 1.42 (0.788) | 29.68** |
| | Female | 1.65 (0.958) | |
| Facebook-type social networks | Male | 1.57 (1.025) | 7.07* |
| | Female | 1.45 (0.931) | |
| Tarot card services | Male | 1.33 (0.788) | 5.79* |
| | Female | 1.21 (0.589) | |
| Turn-based role playing games (TBG) | Male | 1.66 (1.005) | 197.35** |
| | Female | 1.16 (0.497) | |

Note: *= $p < .05$; **= $p < .001$

Table 6. Comparison of Internet uses between males and females.

| Type of use | Gender | Mean (SD) | F |
|-------------------|--------|--------------|----------|
| Text messages | Male | 2.63 (1.007) | 151.20** |
| | Female | 3.18 (0.959) | |
| Calls | Male | 2.44 (0.923) | 46.61** |
| | Female | 2.74 (0.977) | |
| Chat applications | Male | 1.16 (0.586) | 8.43* |
| | Female | 1.09 (0.421) | |
| Internet | Male | 1.97 (0.946) | 67.42** |
| | Female | 1.64 (0.795) | |
| Games | Male | 1.37 (0.786) | 16.32** |
| | Female | 1.24 (0.594) | |

The regression analysis concerning Internet applications showed that the various types of Internet use explained

27.5% of the variance in the total CERI score ($F [10,1878] = 70.9, p = .000$). These were, in order of amount of variance explained, chat applications (10.2%), chat applications (*Messenger*) (7.3%), social networking applications (3.2%), Turn-Based Games (i.e., strategy video games, such as *Civilization*) (2.2%), blogs (2.2%), Tarot card services (1.1%), online publications (0.4%), forums (0.4%), electronic mail (0.3%) and sport-related games (0.2%) (see Table 7).

Table 7. Regression analysis of total CERI score by type of Internet use (n=1,879)

| Predictor variable | R squared | ΔR squared | B | t |
|--------------------------------|-----------|------------|------|-------|
| Chat applications | .102 | .102 | .185 | 8.87* |
| Messenger | .175 | .073 | .219 | 9.86* |
| Social networking applications | .207 | .032 | .116 | 5.31* |
| Turn-based games | .229 | .022 | .107 | 4.82* |
| Blogs | .251 | .022 | .132 | 6.45* |
| Tarot card services | .262 | .011 | .103 | 4.97* |
| Online publications | .266 | .004 | .064 | 3.04* |
| Forums | .270 | .004 | .060 | 2.86* |
| Electronic mail | .273 | .003 | .058 | 2.59* |
| Sports games | .275 | .002 | .050 | 2.29* |

* = $p < .05$

In relation to cell phone use, regression analysis showed that the various forms of use explained 28.1% of the variance in total CERM score ($F [5,1873]=146.5, p = .000$). Text-messaging explained 12.5% of abusive use, games 10.3%, Internet 2.3%, and chats and calls 1.6% each (see Table 8).

Table 8. Regression analysis of total CERM score by cell phone uses (n=1,879)

| Predictor variable | R squared | ΔR squared | B | t |
|--------------------|-----------|------------|------|--------|
| Text-messaging | .125 | .125 | .282 | 13.50* |
| Games | .227 | .103 | .190 | 8.15* |
| Internet | .250 | .023 | .155 | 7.30* |
| Chat applications | .266 | .016 | .141 | 6.42* |
| Calls | .281 | .016 | .133 | 6.36* |

* = $p < .05$

Discussion

Internet use

Frequent problems with Internet were reported by 6.1% of the participants. Problematic use was greater in the youngest age groups. The most used applications were chat applications (*Messenger*), electronic mail, information search engines, and peer-to-peer services (i.e., file sharing), but regression analysis results showed that the applications that contributed most to problematic Internet use were slightly different: chat applications and *Messenger* followed by social networking applications, games, and blogs. These results suggest that few students have problems with Internet use and that problematic use is associated with communication-related applications.

The reported prevalence rates of problematic Internet use in other Spanish studies vary from 3.7% (Estévez et al., 2009), 5% (Viñas, et al., 2002), 6.2% (Jenaro, et al., 2007) and 9.9% (Muñoz-Rivas, Fernández & Gámez-Guadix, 2010). In these studies, the most used applications were academic web sites, chat applications (particularly *Messenger*) and electronic mail (Estevez, et al., 2009; Muñoz-Rivas, Navarro & Ortega, 2003; Viñas, et al., 2002). Likewise, the results found in this study are also similar to other studies in other countries that have identified internet addiction among a small but significant minority of teenagers and students including Italy (Pallanti, Bernardi, & Quercioli, 2006), Norway (Johansson & Gotestam, 2004), Turkey (Ceyhan, 2008; Canan, Ataoglu, Nichols, et al., 2010), Poland (Zboralski, Orzechowska, Talarowska, et al., 2009), England (Niemz, Griffiths, Banyard, 2005), China (Cao & Su, 2007), Iran (Ghassemzadeh, Shahrray, & Moradi, 2008) and other South East Asian countries such as Taiwan and Korea (Ha, Kim, & Bae, 2007; Kim, Ryu, Chon, et al. 2006; Park, Kim & Cho, 2008).

It is important to distinguish between the applications used most as this may provide insight into explanations of problematic Internet use. In the authors' opinion, the synchronous communication applications requiring the user to somehow identify themselves (such as chat rooms where true identity is typically concealed, or online role-playing games where avatars are used and in which identity can also be concealed or altered), are the ones that best explain this problematic use and confirm early speculations in the field (e.g., Griffiths, 1996; 1998) and more recent empirical work (Widyanto & Griffiths, in press; Widyanto, Griffiths & Brunson, 2010). Thus we can distinguish use of chat applications (*Messenger*) or participation in social networks, from forms involving altered identity communication (AIC). In AIC, playing with one's identity can become problematic and/or pathological as the users take on alternative (i.e., false) identities that provide greater satisfaction than their true self, allowing them to escape from their true self (Carbonell, Talarn, Beranuy, Oberst & Graner, 2009; Griffiths, 2000). In the case of chat applications such as *Messenger*, the negative consequence is time wasted, while the positive aspect is maintenance of social relations with friends and acquaintances and broadening of the social network. According to this hypothesis, the Internet serves as a medium for three differentiated uses: informational (whether occupation-related, academic or recreational), communicational (e.g., social networking, emailing), and altered-identity communication (e.g., online gaming, chat rooms, etc.), with only the latter one being potentially addictive.

An alternative hypothesis could be that the communicational use, and more specifically, the individual communication of personal information as chat applications (*Messenger*) and social networking applications, could also be problematic. This hypothesis could also partially explain why secondary students tended to have more problems with Internet (and cell phones) than university students. Our data show

that problems with internet and cell phones declines with age. It was unexpected that boys and girls aged between 12 and 14 years used more AIC than university students aged between 18 and 25 years and, at these ages. Here, the individual communication of personal information appears to be a very important factor in their identity and social development.

Moreover, there appears to be a relationship emerging between problematic Internet use and various psychological disorders including: major depression, anxiety and insomnia (Viñas, et al., 2002); insomnia, social dysfunction, depression and anxiety (Jenaro, et al., 2007); 'negative thoughts' and neuroticism (García, et al., 2007); lower scores on the dimensions of self-direction and cooperation, and higher scores on novelty-seeking and somatic symptoms, anxiety, sexual dysfunction and depression (Estévez, et al., 2009); and to relieve emotional distress (Muñoz-Rivas, Fernández & Gámez-Guadix, 2010).

A previous study by the research team also reports the relation between psychological distress and maladaptive use of Internet and cell phone (Beranuy, et al., 2009). Once again, these psychological disorders may be mediated by altered-identity communications. In other words, the duration of connection would not be, *per se*, the only cause of psychological impairment (Griffiths, 2010); those engaging in altered identity communications are the ones with most severe psychological impairments and are probably the people who spend most time connected to the internet. It is logical that there is often strong correlation between time spent on a computer and problematic use (Muñoz-Rivas, Fernández & Gámez-Guadix, 2010; Viñas et al., 2002; Widyanto & Griffiths, 2006). This relation between time and problems is not a direct link and this may therefore explain why those spending eight hours a day connected to Internet for occupation-related or academic reasons do not develop any psychological disorders or impairments (Muñoz-Rivas, Fernández & Gámez-Guadix, 2010; Griffiths, 2010). Findings also seem to indicate that gender does not appear to have any clear role in problematic Internet use, although males spend more time using ICT (Estévez et al. 2009; Muñoz-Rivas et al. 2003; Viñas et al. 2002).

The question then arises as to what extent it makes any sense to use the expression Internet addiction in 2010. The fifteen years of research have made clear that a more specific term is necessary. In the authors' judgment, using the term 'Internet addiction' is equivalent to confound the problems with alcoholic drinks with the addiction to any kind of drink. In this sense, it seems clear that once secondary addictions (or addictions on internet, like to use Internet for gambling) are eliminated, true addictions to Internet are limited to those involving a very specific type of communicational use, altered identity communication (AIC). The remaining uses of internet appear to be safe (in sense of addiction) and the term should be abandoned just as 'computer addiction' has become an obsolete term.

Cell phone use

Frequent problems with cell phone use were reported by 2.8 % of the participants. This problematic use was greatest in the youngest age groups. The most used applications were text-messaging and calls. Additionally, occasional problems with cell phone were reported by females. Regression analysis results showed that the types of cell phone use that contributed the most to problematic use were text-messaging and playing games, whereas calls contributed least. These results suggest that very few young people have problems with cell phones, in contrast with the findings of Jenaro, et al. (2007) who reported 10.4% of pathological cell phone use and of Labrador and Villadangos (2010) who reported 7.9% having frequent perceived problems with their cell phone. Our results suggest that females have some difficulties with phone use. Other researchers have reported that females use cell phones more than males, and perceive their use as more problematic than boys (Beranuy, Oberst, et al., 2009; Chóliz, Villanueva & Chóliz, 2010; Labrador & Villadangos, 2010). It should also be noted that cell phones are becoming more varied in their use and new applications such as the playing of games appears to be more attractive to males (Jenaro, et al., 2007).

The distinction this study used for Internet use relating to information use, communication use, and identity-altered communication use, also helps explain the possible differences in cell phone use. The traditional use of cell phones has been for communication. Since calls and messages are exchanged with people whose identity is known, there is no AIC and therefore the risk of problematic and/or addictive use is likely to be very low. However, this risk could potentially be higher for the new uses of cell phones that permit applications that promote the altering of user identity. However, there are other elements, not examined in this study, which may provide additional insight into the perception of problematic cell phone use.

For instance, some people may confuse or self-define dependence on a particular technology as an addictive behaviour. For this reason, some people consider themselves cell phone addicts because they never go out of the house without one, do not turn it off at night, are always expecting calls from family members or friends, and/or they over-utilise it in their work and/or social life. Finally, there is also the importance of economic and/or life costs (Griffiths, 2005). The crucial difference between some forms of game playing and pathological game playing is that some applications involve a financial cost. If a person is using the application more and is spending more money, there may be negative consequences as a result of not being able to afford the activity (e.g., negative economic, job-related, and/or family consequences). High expenditure may also be indicative of cell phone addiction but the phone bills of adolescents are often paid for by parents, therefore the financial problems may not impact on the users themselves.

Is there really an addiction to Internet and/or cell phones?

It is very difficult to determine at what point problematic ICT use becomes an addiction. The cautiousness of researchers (Estévez, et al., 2009; García, et al., 2007; Muñoz-Rivas, 2003; Viñas, et al., 2002) suggests that we are not yet in a position to confirm the existence of a serious and persistent psychopathological addictive disorder related to ICT on the basis of population survey data alone. This cautiousness is aided and supported by other factors including: (a) absence of any clinical demand in accordance with the percentages of problematic users identified by these investigations: the psychological services of the research team and colleagues in the field have not registered any demand for treatment of addiction to ICT (although there are isolated cases in Barcelona hospitals); (b) the questionnaires could be measuring “concern” or “preoccupation” rather than “addiction”; (c) the normalisation of behaviour and/or absence of any concern as users grow older; (d) social adaptation: adolescents perceive that television generates twice as many problems as Internet, and ten and five times (girls and boys, respectively) more problems than videogames (Labrador & Villadangos, 2010); (e) it is important to distinguish between time lost for periods more or less prolonged and a real addiction; and (f) the significant correlation between CERI and CERM scores (Beranuy, Oberst, et al., 2009) suggests a common factor of concern or adaptation to the technology.

All the Spanish studies agree in the necessity of longitudinal studies in order to check if perception of the problematic use of TIC still exists over time. Many of our university students explain that they have been ‘addicted to *Messenger*’ during some period of their adolescence. In our opinion, they are describing a period of their development with strong needs of social ties rather than a true addiction. These communication needs could be met by the telephone (in the 1970s), chat rooms such as *Messenger* (in the 1990s), and the social facilities at the beginning of the new century. We need to understand this in a developmental context rather than in a pathological contextual frame.

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- Alternatively, Muñoz-Rivas, Fernández and Gámez-Guadix (2010) suggest that some symptoms of tolerance, abstinence, loss of control and interference in their family, social and academic lives and in activities that they previously found satisfying are similar to those of other behavioral addictions. In this sense, Labrador and Villadangos (2010) state that, mainly Internet and television, produce relaxation and discomfort if they cannot be used similarly to those produced by other established addictions.
- We have postulated that the AIC applications are the primary reason that could explain why some people developed a problematic use of some massively multiplayer online role playing games and chat rooms. Similarly, Wang and Chu (2007) in a research based on the theory of passion postulated by Vallerand et al. (2003) concluded that harmonious and obsessive passion affect addiction differently, and only obsessive passion affect online game players’ addiction. Furthermore, we need to describe the negative and positive reinforcement (similar to the role that money plays in pathological gambling) that would help us to understand why some people invest so much time and energy for a period of time in this ICT.
- One limitation of the comparative part of the present study is the disparity of instruments utilised by researchers to assess ICT usage and risk of addiction, something difficult to avoid despite constant recommendations by those working in the field (Griffiths, 1998; Widyanto & Griffiths, 2009). Based on the data presented in this study, there may be an argument for limiting the number of population surveys and utilising other methods such as the study of clinical samples of ICT addicts in treatment in specialised units. This would help distinguish bona fide addictive problems featuring psychological dependence and severe harmful effects (Sánchez-Carbonell et al., 2008) from transitory and less harmful symptoms. By doing this, it is likely that most problematic ICT users will comprise those individuals that use the internet for altering their identities (e.g., online gamers, online chat room users).
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