Title: Internet and cell phone usage patterns among young adults with intellectual disabilities

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Abstract

Background: The risks and opportunities associated with the use of technologies are of growing research interest. Patterns of technology usage illuminate these opportunities and risks. However, no studies have assessed the usage patterns (frequency, duration, and intensity) and related factors in young people with intellectual disabilities. Methods: Questionnaires on Internet and cell phone usage patterns, the Internet Over-Use Scale and the Cell-Phone Over-Use Scale, as well as the Beck Depression Inventory were filled out in one-on-one interviews of 216 youth with intellectual disabilities. Results: Young people with disabilities make more social and recreational rather than educational use of these tools, and show higher rates of excessive use of both technologies than a comparison group of 410 young people without disabilities. Also, their overuse is associated with other unhealthy behaviors. Conclusion: The framework of support needs of people with disabilities should be considered to promote healthy Internet and cell phone use.

Keywords: youth, intellectual disabilities, Internet use, cell phone use, Internet addiction, assessment

ICTs and, in particular, the Internet and cell phones have become essential elements in our lives. Today our quality of life in work, social relationships, leisure, personal development, and health cannot be conceived without having our Internet connected computer or cell phone. In addition, for people with disabilities, ICTs constitute a very valuable tool because, for many, they provide easier access to information, training, leisure, and relationships. However, as with any tool, but especially with these ubiquitous, generalized, and immediate technologies, several negative consequences derived from overuse can be noted. When we talk about over-use we are referring to the consequences derived from an excessive use in terms of frequency, intensity or duration, that may interfere with other significant activities of daily life. Here, other authors talk about Internet of cell phone addiction. These behavioral addictions have similarities to substance addictions, such us the urge or craving to use these technologies, tolerance, and withdrawal (Grant, Potenza, Weinstein, & Gorelick, 2010). Internet addiction, for example, has been found associated to several psychological risks such as depression, anxiety, stress, loneliness, etc., among adolescents and young adults from different countries (Cheng et al., 2015, Ostovar et al., 2016; Zeng et al., 2016). Behavioral addiction type behaviors should be differentiated from inappropriate technology use, misuse, and risky behaviors, such as pathological online gambling, online pornography consumption, and cyberbullying that are derived from the type of use regardless of the extent of the usage.

Technology overuse (frequency, duration, and intensity) has received numerous names such as problematic use, compulsive use, addiction or dependence (Rial et al., 2014). Regardless of the name, Internet addiction is increasingly recognized as a serious psychological disorder and a relevant social problem in adolescents and the young, which

affects their positive development (Zhang et al., 2014). From a diagnostic point of view, it is important to note that this addiction is not recognized in the DSM-IV or in the DSM5; only Internet Gaming Disorder (IGD) is identified in the fifth edition in Section III of the appendix, as a condition warranting more clinical research. The Internet, when properly used, is a healthy and useful tool (Caton and Chapman, 2016); however, without proper guidance, it can adversely affect the development of adolescents.

Internationally, and focusing on adolescents and youth, there are numerous studies which refer to the harmful effects of excessive use of these technologies with the general population, and some conclusions seem to emerge from such studies. The more widespread the use and the longer since adoption, the stronger the effects, both personally and collectively as a country. For example, in Europe the pathological use (i.e. overuse that meets the criteria for Internet addiction) of the Internet and cell phones in adolescents have a prevalence of between 4% and 10% (Durkee et al., 2012, Jenaro et al., 2007, Lopez et al., 2013, 2014, Siomos et al., 2008). While these data are sufficiently high to warrant further study, the prevalence pales when compared to countries with a longer tradition and greater technological development (Zhang et al., 2008). For example, the prevalence of Internet addiction in studies of Asian populations is between 13.5 and 26.8% (Lin et al., 2011, Wu et al., 2013). The degree of adoption and diffusion of these tools in our society help explain their impact (Zhang et al., 2008) and it is important to note that among countries, the access to these technologies by individuals with disabilities varies greatly.

The excessive use of or dependency on such technologies has been found associated with physical, psychological and social issues. From a physical point of view, one of the main issues derived from excessive use of ICTs relates to the difficulty or impossibility of

carrying out other activities such as sleeping, eating, practicing physical exercise or sports, as the use of these technologies becomes a "full time job" (Canan et al., 2013, 2014, Jenaro et al., 2007, King et al., 2014, Koc and Gulyagci, 2013, Rodgers et al. , 2013, Lepp et al., 2013, Li et al., 2015).

Research has also identified variables with broad consensus associated to psychological issues of interest such as anxiety (Koc and Gulyagci, 2013, Jenaro et al., 2007, Mehroof and Griffiths, 2010) and depression (de Leo and Wulfert, 2013, Fortson et al., 2007, Koc and Gulyagci, 2013, van den Eijnden et al., 2008). A third area deals with issues related to impulse control disorders such as pathological gambling, kleptomania, and use of alcohol, drugs, and tobacco (Batıgün and Kılıç, 2011, Dalbudak et al., 2013, Oktan, 2011, Billieux et al., 2007, de Berardis et al., 2009), as well as other conditions such as ADHD (Dalbudak et al., 2013, Chen et al., 2015, Yen et al., 2009, Yoo et al., 2004).

From a social standpoint, there is literature on interpersonal problems, communication issues, and social isolation (Ayas, 2012, Cao and Su, 2007, Fortson et al., 2007, Ozcinar, 2011, Yeh et al., 2008, Yuen and Lavin, 2004). Academic failure and conflictive family interactions are also commonly found associated variables (Huang and Leung, 2009, Huang et al., 2009, Lepp et al., 2014, Li et al., 2015, Ozcinar, 2011, Yen et al., 2007, Yu and Shek, 2014).

In the literature on the general population, the most mentioned socio-demographic risk factors for technology overuse are age, and being an adolescent or belonging to the Net Generation with subsequent early exposure to these technologies (Munoz et al., 2010). Another relevant factor is gender, with being female acting as risk factor for overuse (Ha and Hwang, 2014, Jenaro et al., 2007). In addition, the influence of parents, both with

regard to proper management of technologies, as well as in regard to overprotection or permissiveness, has been found related to patterns of use by children (Park et al., 2008, Siomos et al., 2012, Ahmadi and Saghafi, 2013, Chen et al., 2015).

Concerning disabilities, the few existing studies on usage patterns focus mostly on groups with physical or other disabilities unrelated to intellectual or developmental disabilities. In fact, in the field of disability, the analysis of ICT usage patterns and the impact on the user has focused mainly on the benefits that these technologies can provide (Caton and Chapman, 2016, Chadwick et al., 2017, Raghavendra et al., 2013, Shpigelman and Gill, 2014, Zubal-Ruggieri, 2007), or in accessibility (or rather lack of it). Studies on the risks associated with usage patterns are very scarce (Buijs et al., 2016) and consist of theoretical and systematic review studies (Caton and Chapman, 2016, Normand and Sallafranque -St-Louis, 2015) or in information provided by third parties (Löfgren-Mårtenson, et al., 2015, Chadwick et al., 2017).

Furthermore, we are just recognizing that people with disabilities can use them excessively or inappropriately (i.e. cyberbullying) (Heiman et al., 2015, Yen et al., 2014). For example, one of the few studies on Internet use patterns by children with learning disabilities showed that they used these resources to a lesser extent for training activities and more to communicate with online friends and to alleviate feelings of loneliness (Sharabi, 2013, Sharabi and Margalit, 2011). Concerning developmental disabilities, one study with individuals with Williams syndrome found that they displayed behaviors that could lead to online victimization (Lough and Fisher, 2016).

The definition of intellectual disability takes an explicit interactive view of the individuals who may have deficits in conceptual, practical, and social skills, and may

require support in various areas to ensure their best performance, participation and inclusion (Shogren et al., 2014, Thompson et al., 2002, Thompson et al., 2009, van Loon et al., 2010, Wehmeyer et al., 2008). The characteristics of each individual with intellectual disabilities in interaction with the environment (education, employment, leisure, home life, etc.) in which ICTs are used, without the necessary supports, can make these users vulnerable (Salmeron et al., 2016), and lead them to experience victimization (Kowalski et al., 2016, Buijs et al., 2016, Wells and Mitchell, 2014). On the positive side, since ICTs are now available in all relevant vital areas and for meaningful tasks, technology plays a key role as support tools in favoring participation and inclusion. The key is how they are used or how do we help individuals with intellectual disabilities use them.

In this field, we must take into account that, added to the vulnerability associated to disability and other personal factors such as gender, there are social factors, such as family characteristics, and family attitudes towards technology and its uses, and the availability of technologies, etc., that have been studied in the general population but have not yet, with a few exceptions (Löfgren-Mårtenson et al., 2015, Good and Fang, 2015) received attention with populations with disabilities. The increasing democratization of ICTs provides an expansive view of their possibilities in countries and groups were they are so far largely alien. Hence the importance of studying this topic to make proposals that allows healthy use in vulnerable groups such as people with intellectual disabilities.

Thus, and in view of the previously mentioned, in the present study we aim to examine: (1) the Internet and cell phone use of individuals with intellectual disabilities compared to a group without disabilities; (2) the association between using these technologies and other healthy or unhealthy behaviors, as well as personal and contextual characteristics; (3) the

percentage of participants with intellectual disabilities who are making excessive use of ICTs and who could be considered addicted to them, in contrast to the comparison group; (4) the variables that contribute to differentiate excessive users versus those with proper use; (5) the criteria, consistent with the DSM5 for addiction, that best define overuse or dependency.

Method

Participants

All participants were 18 years of age or older, attending educational facilities consisting of college (for participants without disabilities), and special vocational training or occupational centers for young adult people with intellectual disabilities, where having a diagnosis of intellectual disability is a requirement for being eligible to attend those educational facilities. These centers teach occupational activities (e.g. gardening, janitorial positions), together with personal and social adjustment skills) Inclusion criteria were: (a) be a user of a cell phone or the Internet; (b) have given informed consent. In the case of individuals with intellectual disabilities, the additional consent of a parent or guardian was requested if such consent was a requirement from a legal standpoint; (c) be able to understand the questions that were posed in a one-on-one interview in the case of the group with disabilities and through an online application in the case of the comparison group. Confidentiality, anonymity and the possibility of terminating the questionnaire when desired were also guaranteed in all cases. The collaboration of professionals from the centers and the training of the interviewers eliminated abandonment during the process.

The target population consisted of 216 young people with intellectual disabilities attending three vocational training centers and 410 university students studying different

degrees, with a predominance of psychology (60.5%) and occupational therapy (9.3%) students. Of the total, 30.4% (n = 190) were men and 69.6% (n = 436) were women. The average age was 22.72 years (SD = 3.38; range: 18-39). To ensure comparability of the subsamples, and to identify patterns of "normative" use by young people of a given generation, the groups with and without disabilities were matched by gender (Chi 2 = 2.980, df = 1, p = .084) and age (F = .195, p = .659). The young people with disabilities were attending occupational centers for people with intellectual disabilities located in Salamanca (n=61) and Madrid (n=155), Spain. The comparison group was composed of young people without intellectual disabilities attending the University of Salamanca.

Measures

For this study, the Internet Over-use Scale (IOS) and Cell-Phone Over-use Scale (COS), developed and validated with Spanish population (Jenaro et al., 2007), as well as the Spanish version (Sanz and Vázquez, 1998) of the 1979 Beck's BDI (Beck et al., 1979) were used. The measures on Internet and Cell-Phone Overuse have been used in previous studies with the general population (Jenaro et al., 2007, O'Connor et al., 2013) and consists of 24-items that assess (by way of parallel forms) the characteristics associated with pathological Internet or cell phone overuse, to be rated in a 6-point likert type scale, with 1 meaning never, and 6 meaning always. More specifically, the items include 7 of the 9 criteria in the DSM5 used to diagnose pathological gambling. They do not include criteria 6 (attempts to recover losses) or 9 (relies on others to provide money to relieve their financial situation).

The items of the IOS and the COS are grouped into three factors: (1) *Intra and interpersonal conflicts*: composed of nine items that denote negative consequences for both

oneself and for others, derived from the failure to reduce, pause or stop the use of ICTs, including lies to conceal the extent of involvement with this activity [e.g. *"Do you refrain from going out with your friends in order to spend more time using the Internet/mobile phone?"*]. (2) *Tolerance and withdrawal*: composed of 10 items denoting addiction that relate to the need to invest increasing amounts of time to get the desired satisfaction, the emergence of symptoms of anxiety, discomfort or irritability when attempting to reduce, stop or avoid using these technologies, including using them when feeling distressed and experiencing preoccupation [e.g. *"Do you feel agitated or worried if you are not using the Internet/ mobile phone?"*]. (3) *Loss of control*, consisting of four items that refer to investing excessive time with these technologies and the resulting problems [e.g. *"Do you think that your academic or labor performance has been negatively affected by the use of the Internet/mobile phone?"*]. Table 1 summarizes the reliability indexes obtained, which support their adequacy for the target population.

----------Table 1---------- ----------

Concerning the Spanish version of the Beck Depression Inventory, BDI (Beck et al., 1979, Sanz and Vázquez, 1998), the cutoff point to distinguish clinical vs. general population is 18 points. The reliability index obtained in the present study was $\alpha = .910$ for the group with disabilities and $\alpha = .879$ for the comparison group.

In addition to these instruments, the first section inquired about demographic data and the characteristics (frequency, duration, intensity, etc.) of the use of both technologies, as well as the performance of unhealthy (drinking, smoking, playing, gambling, substance use) and healthy (exercise, sleep, eating) behaviors.

Procedure

Contacts with centers for individuals with intellectual disabilities were established during the second semester of 2015 by means of letters with a description of the research, the measures to be used, the ethical cautions and the required approvals. Direct interviews with professionals, as well as presentations to parents and potential participants were maintained to explain the aims of the study and the tasks to be performed by all involved. After permissions were granted, students with intellectual disabilities were invited to participate and data gathering took place from December 2015 to June 2016. Data gathering for the group with disabilities was conducted using one-on-one interviews in which each participant was helped to understand and to fill out the scale. Visual aids (amplified text, emoticons, color coding) were used when required.

Participation was voluntary and anonymity was guaranteed. All the authors of the present study acted as interviewers and participated in training sessions to ensure homogeneity in the application of the interview and in the use of the previously mentioned extra aids. Once each interview was finished, the participants with disabilities received a gift, a notepad and pen; participants interviewed in December also received Christmas ornaments. The process for the participants with disabilities used the following steps: (1) visual aids were developed to facilitate the response of participants; (2) letters were sent to entities requesting their participation; (3) centers were contacted to plan assessment visits; (4) permission and consent from participants, and parents or guardians when legally required, were obtained; (5) questionnaires were completed via individual interviews; (6) global reports, disaggregated by centers, were sent. The comparison group filled out the instruments using an online application.

Analysis

Statistical analyses were performed using the SPSS v.15 software. In addition to Cronbach's alpha to estimate the reliability of the subscales and scales, routine descriptive (frequencies, percentages, means and variances) and correlational (Pearson) analyses were performed. Multivariate GLM tests were used to determine the possible existence of differences in the variables of interest taken together. If the multivariate analysis was significant, univariate analysis of variance was performed. Chi Square tests were used to explore the association between categorical variables. Likewise, multiple regression analysis was used to identify predictors of clinical use of Internet and cell phone and discriminant analysis was used to determine the extent to which the different DSM5 criteria included in the scales were relevant for identifying population with normal vs. clinical use of both technologies.

Results

Patterns of technology usage by studied groups

Tables 2 and 3 depict data on Internet and cell phone usage. For each variable we have performed Chi 2 tests to determine the possible association between the studied variables and group membership. Thus, concerning Internet use, it is possible to see that, in contrast to the comparison group, people with disabilities have had more recent access to the technology and they use it less frequently. However, they stay connected for longer periods of time. They use it in the evening rather than at night. As for the places where they connect, the pattern for both groups is quite different, with a tendency by the disabilities group who take advantage of free WiFi sites and they have less usage in learning contexts (learning centers, libraries). In a similar vein, this group accesses formative resources to a lesser extent while using applications to upload photos (Flickr), videos (YouTube), and

chats for online dating more frequently. As for how the Internet is used, although the comparison group, in most cases, makes greater use by percentage, people with disabilities spend more time meeting new people and establishing relationships and playing online.

Concerning mobile phone use, the disabled people and their families are more recent users and have less access (air time, data plans, paid SMS) than the comparison group. However, the daily use tends to be similar, but with lower spending. They also have less access to instant messaging (all forms) but those who do have access use it the most. As for specific uses of cell phones, there is no overall pattern but the comparison group makes greater use in general with the exception of playing games online and texting, where people with disabilities have greater usage.

---------- Insert Tables 2 and 3 here ----------

ICT usage patterns and associated variables

Second, to determine whether overuse patterns may be part of a wider pattern of other unhealthy behaviors, we began by analyzing whether the groups are comparable in terms of the performance of these behaviors. Thus, the analysis of the possible association between the occurrence of healthy or unhealthy behaviors (e.g. sport, drinking, sleeping, smoking, etc.,) and the group revealed no significant association with smoking (χ^2 = 2.099; df=1; p = .147), substance abuse (χ^2 = 2.380; df=1; p = .123), drinking (χ^2 = 2.962; df=1; p = .085), or gambling (χ^2 =. 159; df=1; p = .691), although significant associations were found with playing slot machines (χ^2= 11,499; df=1; p = .001); while 2.8% of participants with disabilities had this behavior, none of the participants in the comparison group engaged in this type of activity. As for healthy behaviors, the data indicated significant associations regarding adequate sleep (χ^2 = 16.230; df=1; p = <001); while 88% of people with

disabilities reported enough sleep, for the peers without disabilities the percentage was 74.1%. Data on moderate physical activity were also significant (χ^2 = 4.435; df=1; p = .035), with 73.6% of disabled people indicating activity versus 65.4% in the comparison group. Similarly, significant differences were found for sports (χ^2 = 56.068; df=1; p <.001), with 63.9% of people with disabilities participating in sports regularly, while only 32.7% of their peers without disabilities answered affirmatively. Thus, the people with disabilities under study appear, overall, to be more active and sleep better, although a small percentage may have problems with gambling.

The analysis of the association between the healthy behaviors and scores on the COS and IOS revealed significant and negative associations (r = - .109, p <0.05, and r = - .154, p. <.01, respectively) for the comparison group, but not for the group with disabilities. The analysis of the association between unhealthy behaviors and scores on the COS and IOS revealed significant and positive associations only with the IOS (r = .106, p <0.05) for the comparison group. In the case of persons with disabilities, there was positive and significant association with the scores on both the COS and IOS (r = .213, p <0.01, and r = .327, p <.01, respectively).

Rates of ICT dependence

Third, to determine similarities and differences between groups, it was necessary to begin by identifying cases of dependence on Internet and cell phone. This involved the following steps: (1) identification of responses that indicate excessive use in each criterion. Overuse is defined as obtaining a mean score of 3.5 or higher, given that each item is rated on a scale from 0 (never) to 6 points (always). (2) Computation of DSM 5 criteria met; meeting 4 or more of the 7 criteria (i.e. C1: tolerance, C2: abstinence, C3: lack of control,

C4: preoccupation C5: escape, C7: lies, C9 negative repercussions) denotes the existence of a behavioral addiction similar to pathological gambling. Such addiction would have an average-moderate intensity. A more moderate-severe problem requires meeting 6 or 7 criteria. The obtained results are summarized in Table 4. It can be seen how, taken together, for the group of persons with disabilities, 19.4% (n = 42) and 27.3% (n = 59) have a clinical use of cell phones and the Internet, respectively. For the comparison group, the percentages are 8% (n = 33) and 7.8% (n = 32) for clinical use of cell phone and Internet, respectively. Analyses indicated that the percentages were significantly different for both cell phone (χ^2 = 17,421; df = 1, p <.001), and Internet (χ^2 = 43.344, df = 1, p <.001) use. The analyses of the possible association between group membership and gender revealed no significant association in both groups, suggesting that men and women of the same group had similar use.

---------- Insert Table 4 here ----------

Further, Figure 1 depicts the percentage of participants that meet each of the criteria for the diagnosis of an addictive disorder. It can be seen that, for the group of people with disabilities, the most frequently met criteria relate to criterion 1 (tolerance), criterion 3 (loss of control) and criterion 5 (escape). For the comparison group, the most frequently met criteria are the same although to a much less extent and with predominance of compliance with the criterion 3 (loss of control), followed by criterion 1 (tolerance) and criterion 5 (Escape). Thus both groups obtained relatively similar patterns but with much lower frequency for the comparison group.

---------- Figure 1----------

Factors associated to dependent and non-dependent users with intellectual disabilities

Focusing specifically on the group of people with disabilities, we proceeded to perform various analysis, starting with usage patterns and their association to the domains of the IOS and COS. As to the possible differences in the three factors of the measures by gender, multivariate analysis were not significant for the use of cell phone (Wilks'λ = 0.979; $F_{(3,212)}$ = 4,547; p = .211; η^2_p = 0.021) and Internet (Wilks'λ = 0.981; $F_{(3,212)}$ = 1.391; p = .019; η^2_p = 0.019). However, the time since receiving a cell phone resulted in significant differences (Wilks'λ = 0.849; $F_{(9,441)}$ = 3.401; p <.01; η^2_p = .053) and univariate contrasts revealed that those with a cell phone for less than one year have fewer problems with losing control in cell phone usage than other groups with longer ownership. The impact of money spent monthly on a cell phone was also significant (Wilks'λ = 0.103; $F_{(9,502)}$ = 2.321; p = .013; η^2_p = .033) and univariate analysis showed that the extreme groups (i.e. less than 10 Euros or more than 40 Euros) scored significantly higher in intra and interpersonal conflicts than the intermediate groups. The terminal type (conventional cell phone vs. Smartphone) had no significant differences but the type of contract did (Wilks'λ = 0.923; $F_{(6,394)}$ = 2.618; p = .017; η^2_p = .038) and univariate contrasts indicated that scores on Tolerance and Abstinence are significantly higher for those who have both a contract and prepaid card (which also indicates that they have more than one cell phone) and those who have both types of arrangements scored significantly higher in losing control than those who have a contract.

The time occupied using Internet did not result in significant differences (Wilks'λ = 0.911; $F_{(12,467)}$ = 1.396, p = .164; η^2_p = .031), however, patterns of Internet connection have significant influence (Wilks'λ = 0.860; $F_{(9,480)}$ = 3.398; p <.001; η^2_p = .048) and bivariate analysis showed significant differences in abstinence and tolerance and in losing control,

with those who claim to be connected all day long obtaining higher scores than the remaining groups. As for hours a week of Internet usage, multivariate analyses indicated significant differences (Wilks'λ = 0.820; $F_{(15.486)}$ = 2.410, p = .002; η^2_p = .064) and bivariate analysis showed significant differences in all three factors. Post hoc contrasts revealed that higher frequency use is related to significantly higher scores.

Again, focusing on the group with disabilities, we divided the sample between those who meet the diagnostic criteria for "Internet addiction" and "cell phone addiction". Table 4 presents the mean scores on the subscales for both groups and in both questionnaires. It can be seen how the clinical group scored higher in all factors and for both instruments. To this, the clinical group for cell phone usage obtained significantly higher scores on the BDI than the normal group (M = 11.19, SD = 9.72 vs. M = 6.41, SD = 9.18). Multivariate contrasts indicated that neither gender nor the interaction of gender with membership in one group or another accounted for significant differences. Similarly, the clinical Internet usage group obtained significantly higher scores on the BDI than the group with normal use of this technology (M = 10.86, SD = 10.45 vs. M = 6.01; SD = 8.72). Again, no gender or gender interaction with membership in one group or another had significant differences. It should be noted that in either case the average BDI scores obtained by the clinical group exceeded the cut-off score of 18 that identifies clinical population.

---------- Insert Table 4 here ----------

Predictive capacity of DSM5 criteria for identifying excessive use of ICTs

Then we estimated the adequacy of the criteria to differentiate, within the group of people with disabilities, between those who can be labeled as "dependent" or "not dependent" on these technologies. Regarding the IOS, the stepwise canonical discriminant

function analysis resulted in a total of 77.8 % of original grouped cases being correctly classified. Only two criteria (Tolerance and Lies) added significant predictive power to the function. (Wilks'λ = .709, df=2; p = <. 001). The specificity of the scale was 91.1% while the sensitivity was 42.4%. Next, we obtained the ROC curve of the IOS. We started from a sample of 59 positive (i.e. with clinical) and 157 negative (i.e. non-clinical) cases. The value of the area under the curve (AUC=.800) denotes very high capacity to discriminate between clinical and non-clinical cases; that is there is an 80% probability that the test correctly classified a pair of people, one as being Internet dependent and the other as not being dependent. Concerning the cutoff point that maximizes sensitivity and specificity, a score of 36.5 has a sensitivity of 94.9% (i.e. it identifies 94.9% cases of Internet dependence) and a specificity of 51.6% in detecting cases that are not Internet dependent.

Concerning the COS scale, three criteria added significant predictive power to the function (Wilks'λ = .507; df=3; p = <001.): Impact, Escape, and Abstinence. The function correctly classified 89.8 %% of cases and was more effective classifying clinical cases (94.8%) than non-clinical cases (69.1%), Next we obtained the ROC curve of the COS from a sample of 42 positive (i.e. dependent on cell phone) and 174 negative (i.e. non-dependent) cases. The value of the AUC =.892 indicates the existence of a very high scale capacity to discriminate between clinical and nonclinical cases. Concerning the cutoff point that maximizes sensitivity and specificity, a score of 49.5 has a sensitivity of 97.6% and a specificity of 70.1% in detecting cases that are not cell phone dependent.

Finally, two multiple regression analysis were performed using the total scores on the IOS and COS as dependent variables, and social, demographic and usage patterns of both technologies as potential predictors. Thus, we try to identify a set of predictors that best

explain a significant proportion of the variance of the dependent variables, avoiding redundancies due to correlations between variables. Since several of the predictors were correlated, the stepwise method was used and the criterion to include a variable in the model was F <.05. Table 5 shows the correlations between the selected variables. Those variables that significantly correlated with the criterion variables were included in the analyses.

---------- Insert Table 5 here ----------

Thus, and with respect to the regression model for cell phone use, the variables that entered into the equation were the scores on the BDI, the time spent daily in cell phone use, the number of healthy behaviors and the weekly time spent on Internet connections. The combination of all these variables predicted 36.5% of the variance. These variables are linearly related ($F_{(4,164)} = 25{,}131$; $p < .001$). Beta coefficients indicate that high cell phone use is predicted by higher scores on the BDI (*Beta* = .352; t = 5.486, p <.001), high time spent daily on cell phone (*Beta* = .326; t = 5.116; p <.001), low number of healthy behaviors (*Beta* = - .161; t = 2,601, p = .010), and high weekly time spent on the Internet (*Beta* = .152; t = 2.309; p = 022).

The summary of the regression model for Internet usage indicated that the variables entered into the regression equation were the number of unhealthy behaviors, connection duration, scores on the BDI and the time spent per day on cell phone usage. The combination of all these variables predicted 32.7% of the variance. These variables are linearly related ($F_{(4,166)} = 21{,}646$ $p < .001$). The beta coefficients indicated that high Internet use is predicted by high connection duration (*Beta* = .311; t = 4.901, p <.001), high scores on the BDI (*Beta* = .225; t = 3.591; p <.001), a high number of unhealthy behaviors (*Beta* =

.254; t = 3.976, p <.001) and a high time spent daily on the cell phone (*Beta* = .186; t = 2.917, p = .004).

Discussion

This study provides data on a currently almost unstudied emerging field. The data suggest that, although people with intellectual disabilities have gained access to ICTs later than other people, their usage patterns are currently comparable, particularly for the cell phone. Greater accessibility and portability of this tool versus the requirements of a computer with internet access help explain these results. It is noteworthy that people with disabilities make more social and less academic use of ICTs than the comparison group. As noted by Whang et al., (2003), in a population without disabilities, the Internet addiction group is more vulnerable to interpersonal dangers, showing unusually close feelings for strangers (Buijs et al, 2016, Katz, 2001, Löfgren-Mårtenson et al., 2015, Normand and Sallafranque -St-Louis, 2015) , which should be considered a warning sign for our studied group, in order to prevent victimization.

The results also suggest lower availability of these tools in learning contexts for people with disabilities as compared to their availability for university students. In addition, the findings suggest that young people with disabilities employ these technologies for social reasons, such as dating or meeting people, or for recreational purposes such as participating in online games to a greater extent. While it is advisable to compare these results with other methodologies to further clarify these results, potential explanations could be related to limited opportunities to engage in relationships, making friends or participate in leisure activities. Discerning whether these results are a consequence of a lack of opportunities or

discrimination, a lack of ability or self-confidence, or a consequence of self-determined choice is ultimately another challenge for future research.

Regardless of the reasons that lead a person to excessive use of these technologies, what this study suggests is that excessive use of both the internet and cell phone is associated to unhealthy behaviors, which agrees with previous studies with general population (Batıgün and Kılıç, 2011, Dalbudak et al., 2013, Oktan, 2011, Billieux et al., 2007, de Berardis et al., 2009). While the size of the association is low, it should be considered when identifying technology over-users with intellectual disabilities.

The present study suggests that people with intellectual disabilities have a more excessive cell phone use with higher dependence (withdrawal and tolerance), and intra and interpersonal conflicts. Regarding the Internet, they obtain significantly higher scores in intra- and interpersonal conflicts although they have more control than their peers without disabilities. A higher percentage of people with disabilities meet four or more criteria for excessive use of both technologies and the percentage of people who meet the criteria for dependence on cell phone or internet are double or triple the comparison group, yielding significant differences. Considering the average scores on the DSM5 criteria and the intergroup comparisons, it is possible to affirm that the profiles are similar in both groups with the most frequently met criteria being tolerance, loss of control, and escape, although the percentages are much higher in the case of people with disabilities. The preoccupation with instant messaging, loss of relationships due to overuse, loss of control and escape, have been found as the main symptoms that characterize young people addicted to instant messaging (Huang and Leung, 2009) in the general population, which was broadly in line with our findings. Once again, it allows us to anticipate the extent to which societies like

ours, relatively less technologically advanced than Asian countries, will face in the near future.

As for disability intra-group comparisons, it seems that the highest scores relate to tolerance and preoccupation generated by Internet, and loss of control and escape associated to cell phone usage. In this regard, studies with young people without disabilities show that the internet is used as a means to escape from negative feelings (Gencer and Koc, 2012, Whang et al., 2003). Also, today's smart phones are actually hand held laptops, which may help explain their greater tendency to be used as a means of (cognitive rather than behavioral) escape from negative situations, as evidenced in studies with people without disabilities (Lin et al., 2015).

The analysis of the factors that help explain excessive use of these technologies is also helpful for early detection and appropriate interventions. Here, dysphoria (i.e. high scores on the BDI) and heavy use of both technologies, accompanying other unhealthy behaviors, help explain between 32.7% and 36.5% of Internet and cell phone use behavior, respectively. While the explained variance is low for both analyses, it is also not a small percentage, taking into account that in this study we have not included other contextual (e.g. parental support) or personal (e.g. academic performance, impulse control, social issues, etc.) variables likely to help increase the predictive power of the equation, as studies with general population suggest (Ayas, 2012, Cao and Su, 2007, Fortson et al., 2007, Ozcinar, 2011, Park et al., 2008, Siomos et al., 2012, Ahmadi and Saghafi, 2013, Chen et al., 2015). Further studies should include additional analysis of the impact (both positive and negative) in physical, psychological, and social variables in people with disabilities.

It is interesting to note that, unlike in general population studies, the gender of the respondent does not significantly contribute to the prediction of overuse in the current study. Perhaps the label of disability imposes a disadvantaged condition that reduces the chances of finding intra-group differences. On the other hand, time since adopting these technologies contributed significantly to usage prediction and this can be understood as good news. It is not previous usage but rather, current practices that helps explain overuse. This opens the door to the possibility of implementing interventions when facing signs of a potentially unhealthy use of the internet and cell phone. In this regard, early detection requires the use of measures such as the COS and the IOS, which have demonstrated adequate reliability (by means of Cronbach's alpha test) and validity (by means of discriminant analysis) to identify people with intellectual disabilities who overuse these technologies.

Some cautions for the current study should be noted. First, concerning the participants, the sample selection procedure limits the generalizability of the findings to populations with educational, social, and personal background similar to those currently studied. In addition, the comparison group was matched according to age and gender. It may be argued that other factors such as intellectual ability, skills in adaptive behavior, or the training status of participants may be influencing the results. Indeed, we recognize that these factors may be influencing the results, and this is precisely our intention. That is, with this study we wanted to have a reference group to reflect the use of "the majority of the users of these technologies, which corresponds to young population with access to Internet and mobile phones". While we could have included participants without disabilities from other educational levels (e.g. vocational training), other factors, such as academic performance,

being employed or not, etc., would still be influencing the results. In short, with the necessary cautions, we can say that the comparison group was chosen to reflect the routine use of teenagers and young people without disabilities and, in this sense, we believe that the data clearly show that the group with disabilities is more vulnerable.

A second limitation relates to the measures used. While current findings supports their adequacy with the studied population, there is no doubt that factors such as simulation or social desirability, along with the possible lack of understanding of some items or inadequate interpretation of others, could be affecting the results. In this regard, having trained the interviewers before collecting the data allows us to feel relatively confident about controlling these variables. However, it is true that the length of the assessment tool led us to eliminate other possible assessment tools for psychological and social correlates, something that was not feasible in the present study and that will be pending for further work.

Finally, another potential limitation derives from the fact that multiple hypotheses are tested at set p-values, which may increase Type I errors (findings of false "significance") (Feise, 2002). Some researchers believe that the p-value should be adjusted to reduce the chance of incorrectly declaring a statistical significance, with Bonferroni being the classical method of adjusting p-value, but no gold standard method exists. We agree with Feise (2002) who claims that statistical significance is a statistical statement of how likely or unlikely an outcome has occurred by chance. If a p-value is .05, there is a rather large chance (1/20) that the finding is in doubt. However, if a p-value is .0001, the chance of error is significantly less (1/10000).

Despite those limitations, we believe this study makes visible a reality that must be interpreted within the supports paradigm (Thompson et al., 2009, Thompson et al., 2002, van Loon et al., 2010) by stressing the relevance of providing supports to ensure fairness, inclusion and participation of people with disabilities in significant life areas, when employing ICT tools, while avoiding the risks of excessive or inappropriate use.

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Table 1. Reliability (Cronbach's alpha) of the factors and total IOS and COS for the group with disabilities and the comparison group

Factor	Group with disabilities		Comparison group	
	IOS	COS	IOS	COS
Tolerance and withdrawal	.831	.867	.777	.839
Intra and interpersonal conflicts	.767	.799	.720	.834
Loss of control	.710	.671	.731	.763
Total	.907	.921	.887	.900

Table 2. Patterns of Internet use for the group with disabilities (GWD) and the comparison group (CG)

Internet use	GWD N (%)	CG N (%)	$\chi 2$	p
Time since using Internet			84.713	<.001
Less than two years	18 (9.3)	5 (1.2)		
From two to five years	72 (33.3)	56 (13.7)		
More than five years	104 (48.1)	349 (85.1)		
Frequency of Internet connections			132.458	<.001
Never	2 (0.9)	0 (0)		
Almost never	4 (1.9)	0 (0)		
Once per month	7 (3.2)	0 (0)		
Two or three times per month	18 (8.3)	0 (0)		
Once a week	9 (4.2)	3 (0.7)		
Once a day	51 (23.6)	25 (6.1)		
Two or three times per day	32 (14.8)	123 (30.0)		
All day long	85 (39.4)	259 (63.2)		
Time when connecting to the Internet			56.568	<.001
In the morning	8 (3.7)	16 (3.9)		
At mid day	3 (1.4)	16 (3.9)		
In the evening	99 (45.8)	100 (24.4)		
At night	53 (24.5)	173 (42.2)		
At all times (all day)	43 (19.9)	105 (25.6)		
Duration of connections			35.190	<.001
Less than 30 minutes	14 (6.5)	111 (27.1)		
30 minutes to 1 hour	75 (34.7)	135 (32.9)		
1,5 to 2 hours	44 (20.4)	65 (15.9)		
More than 2 hours	69 (31.9)	99 24.1)		
Connection time per week			89.631	<.001
0-2 hours / week	24 (11.1)	4 (1.0)		
3 to 6 hours / week	36 (16.7)	55 (13.5)		
7 to 10 hours / week	72 (33.3)	78 (19.0)		
11 to 20 hours / week	33 (15.3)	99 (24.1)		
21 to 40 hours / week	17 (7.9)	116 (28.3)		
More than 40 hours / week	12 (5.6)	58 (14.1)		
Places where they connect to the Internet				
From the computer rooms of the educational center	67 (31.0)	52 (12.7)	30.892	<.001
From the library of the educational center	12 (5.6)	119 (29.0)	47.089	<.001
From the classroom of the educational center	12 (5.6)	103 (25.1)	36.117	<.001
From the cafeteria of the educational center	10 (4.6)	58 (14.1)	13.233	<.001
From home	174 (80.6)	384 (93.7)	25.085	<.001
From friends and classmates' homes	42 (19.4)	103 (25.1)	2.562	.109
From establishments or places with WIFI	97 (44.9)	113 (27.6)	19.095	<.001
From cell phone	154 (71.3)	367 (89.5)	33.627	<.001
Resources accessed				
Platform or Webpage of the educational center	34 (15.7)	380 (92.7)	373.942	<.001
E-mail	143 (66.2)	386 (94.1)	84.357	<.001

Web pages (Digital media, films and series, etc.)	111 (51.4)	295 (72.0)	26.243	<.001
Facebook	121 (56)	356 (86.8)	74.048	<.001
Twitter	42 (19.4)	161 (39.3)	25.372	<.001
Instagram	54 (25.0	205 (50.0)	36.452	<.001
Other social networks (tuenti, Myspace, Pinterest, etc)	18 (8.3)	38 (9.3)	.152	.697
Flickr	10 (4.6)	4 (1.0)	8.639	.003
Youtube	175 (81)	292 (71.2)	7.169	.007
Chats (meetic, edarling, terra, etc)	23 (10.6)	13 (3.2)	14.594	<.001
Search engines for travels, leisure	27 (12.5)	60 (14.6	.538	.463
Participate in blogs or discussion forums	17 (7.9)	27 (6.6)	.357	.550
Online games	80 (37.0)	31 (7.6)	84.260	<.001
Information search engines (Google, Yahoo, Wikipedia, etc)	148 (64.8)	283 (69.0)	1.144	.285
Shopping on the net	18 (8.3)	117 (28.5)	34.138	<.001
Spotify	49 (22.7	203 (49.5)	42.334	<.001
Online banking operations	4 (1.9)	81 (19.8)	38.646	<.001
Specialized health portals, online support, etc.	11 (5.1)	72 (17.6)	19.123	<.001
Specific uses of the Internet				
Information searching for performing academic tasks	167 (77.3)	398 (97.1)	62.796	<.001
Performing academic online tasks	34 (15.7)	287 (70.0)	166.707	<.001
Downloading programs, movies, music…	105 (48.6)	238 (58.0)	5.087	.024
Watching movies, videos, and series online	89 (41.2)	339 (82.7)	112.555	<.001
Download files (books, academic material, ...)	40 (18.5)	315 (76.8)	195.935	<.001
Tracking blogs, videos and other information channels	32 (14.8)	161 (39.3)	39.669	<.001
RSS Feeds	7 (.2)	30 (7.3)	4.227	.040
Communication with friends and / or family	102 (47. 32)	347 (84.6)	97.637	<.001
Meeting new people / establish relationships	37 (17.1)	41 (10.0)	6.593	.010
Access to information in areas of personal interest (hobbies)	110 (50.9)	213 (52.0)	.060	.807
Personal development and growth (e.g. online courses MOOCs, etc)	29 (13.4)	104 (25.4)	12.054	.001
Purchases and sales on the net	11 (5.1)	160 (39.0)	82.039	<.001
Online games	80 (37.0)	40 (9.8)	67.951	<.001
Finding information on health, lifestyles, etc.	33 (15.3)	125 (30.5)	17.345	<.001
Consultations in specialized forums (health, emotional support, etc.)	17 (7.9)	47 (11.15)	1.990	.158

Table 3. Patterns of cell phone use for the group with disabilities (GWD) and the comparison group (CG)

Cell phone use	GWD N (%)	CG N (%)	$\chi 2$	p
Owning a cell phone			67.147	<.001
No	7 (3.2)	2 (0.5)		
Yes, one	159 (73.6)	393 (95.9)		
Yes, more than one	50 (23.1)	15 (3.7)		
Number of cell phones at home			356.752	<.001
None	3 (1.4)	0 (0)		
One	148 (68.5)	5 (1.2)		
More than one	65 (30.1)	405 (98.8)		
Cell phone type			7.897	.019
Smartphone or similar	187 (86.6)	394 (96.1)		
Conventional cell phone	16 (7.4)	12 (2.9)		
Type of contract			25.594	<.001
Prepaid card	47 (21.8)	34 (8.3)		
Contract	155 (71.8)	369 (90.0)		
Both	3 (1.4)	7 (1.7)		
Time since owning cell phone			77.883	<.001
Less than a year	18 (9.6)	144 (35.1)		
From one to two years	28 (13.0)	16 (3.9)		
From two to five years	50 (23.1)	39 (9.5)		
Five years or longer	91 (42.1)	211 (51.5)		
Daily use of the cell phone			2.618	.454
Less than two hours / day	54 (25.0)	81 (19.8)		
3 to 6 hours / day	80 (37.0)	198 (48.3)		
7 to 10 hours / day	20 (9.3)	94 (22.9)		
11 or more hours / day	15 (6.9)	37 (9.0)		
Monthly spending on cell phone			108.760	<.001
Less than 10 €	25 (11.6)	72 (17.6)		
10 to 20 €	90 (41.7)	137 (33.4)		
21 to 40 €	28 (13.0)	173 (42.2)		
41 o more €	9 (4.1)	28 (6.7)		
WhatsApp user			21.576	<.001
Yes	203 (94.0)	409 (99.8)		
No	13 (6.0)	1 (0.2)		
Daily time using WhatsApp			312.723	<.001
Up to two hours	70 (32.4)	77 (18.8)		
3 to 6 hours	53 (24.5)	111 (27.1)		
7 to 10 hours	7 (3.2)	40 (9.8		
11 to 20 hours	12 (5.6)	29 (7.1)		
21 or more hours	13 (6.0)	2 (0.5)		
Specific uses of cell phone				
Make phone calls	183 (84.7)	381 (92.9)	7.213	.007
Video calls (Skype, Viber, others)	37 (17.1)	74 (18.0)	.044	.834
Using instant messaging (WhatsApp, Line)	171 (79.2)	396 (96.6)	51.643	<.001

Using Applications (Facebook, Shazam, Spotify, Instagram, etc)	138 (63.9)	364 (88.8)	50.352	<.001
Download files (music, movies, videos, books, etc)	84 (38.9)	147 (35.9)	.850	.356
Online games (Candy Crush, etc)	109 (50.5)	106 (25.9)	40.369	<.001
Using gadgets (alarms, calendars, calendar, calculator, weather, maps and GPS, etc.)	136 (63.0)	296 (72.2)	4.262	.039
Download other applications	77 (35.6)	186 (45.4)	4.880	.027
Take photos	186 (86.1)	367 (89.5)	8.086	.018
Making videos	145 (67.1)	281 (68.5)	5.736	.057
Texting	66 (30.6)	85 (20.7)	8.223	.004
Email access	95 (44.0)	327 (79.8)	80.321	<.001
Access to the educational center learning platform (homework, etc.)	36 (16.7)	305 (74.4)	190.072	<.001
Download applications to meet other people (Tinder)	28 (13.0)	38 (9.3)	2.165	.141
Consultation bank / bank accounts operations	17 (7.9)	128 (31.2)	43.335	<.001

Table 4. Meeting DSM 5 criteria for Internet and Cell phone use

	Cell phone DSM5 criteria met		Internet DSM5 criteria met	
	Group with disabilities	Comparison group	Group with disabilities	Comparison group
Number of Criteria met	N %	N %	N %	N %
None	77 (35.6)	173 (42.2)	74 (4.3)	121 (29.5)
One	35 (16.2)	110 (26.8)	12 (5.6)	135 (32.9)
Two	34 (15.7)	64 (15.6)	47 (21.8)	75 (18.3)
Three	28 (13.0)	30 (7.3)	24 (11.1)	47 (11.5)
Four	18 (8.3)	26 (6.3)	19 (8.8)	20 (4.9)
Five	9 (4.2)	4 (1.0)	20 (9.3)	6 (1.5)
Six	11 (5.1)	1 (.2)	17 (7.9)	5 (1.2)
Seven	4 (1.9)	2 (.5)	3 (1.4)	1 (.2)
Total	216 (100,0)	410 (100,0)	216 (100.0)	410 (100.0)

Table 5. Pearson's correlations between cell phone and Internet use and selected variables for the group with disabilities

Variable	**COS**	**IOS**
Gender[a]	.027	-.059
Age	-.021	-.061
Healthy behaviors	.027	-.047
Unhealthy behaviors	.213**	.327**
Time since using Internet	.038	.144*
Frequency of Internet connections	-.048	.020
Duration of connections	.125	.285**
Connection time per week	.292**	.251**
Time since owning cell phone	.005	-.017
Daily use of the cell phone	.452**	.275**
Monthly spending on cell phone	.124	.070
Number of cell phones at home	.162*	.165*
Daily time using WhatsApp	.136*	.092
BDI	.459**	.349**

** signif. with p< .01 (two-tails). * signif. with p< .01 (two-tails).

[a]Gender has been coded into 1= male; 2= female