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Problematic Internet and Cell-Phone Use: Psychological, Behavioral, and Health

Correlates

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Abstract

This study aimed to assess pathological Internet and cell-phone use in college students, and to identify psychological, health, and behavioral correlates. A cross-sectional design was utilized to gather data from 337 students. We developed two measures, termed the Internet Over-use Scale (IOS), and the Cell-Phone Over-Use Scale (COS). Additional measures utilized were the Beck Anxiety Inventory, the Beck Depression Inventory, and the General Health Questionnaire-28. Results provide support for internal consistency of the IOS and the COS (alpha=.88 and alpha=.87, respectively) as well as for construct validity. Logistic regression analyses indicated that heavy Internet use is associated with high anxiety; high cell-phone use is associated to being female, and having high anxiety and insomnia. The developed measures seem to be promising tools for assessing these new behavioral addictions.

Key Words: Pathological Internet use, Pathological cell-phone use, Behavioral addictions, Assessment, Test construction

Problematic Internet and Cell-Phone Use in College Students: Psychological,

Behavioral, and Health Correlates

The interest in the study of new addictions related to new technologies is very

recent, with the earliest studies in the 1990s. Excessive Internet use has been studied

since late 90s (Nichols & Nicki, 2004). Data on prevalence estimate that approximately

6% of the surveyed sample met the criteria for Internet addiction (Greenfield, 1999).

Some studies find association between problematic Internet use and several

psychological and behavioral correlates. For example, there is evidence of association

between Internet over use and anxiety, depression, social isolation, low self-esteem,

shyness, and lack of emotional and social skills (Caplan, 2005; Chou, Condron, &

Belland , 2005; de Gracia,Vigo, Pérez, & Marco, 2002; Engelberg & Sjoberg, 2004;

Kim, Ryu, Chon, Yeun, Choi, Seo & Nam, 2006; Morahan-Martin & Schumacher,

2000; Whang, Lee, & Chang., 2003; Young & Rogers, 1998). Yet, some studies have

found positive consequences of Internet use in over-users (Andrade, 2003; Campbell,

Cumming, & Hughes, 2006).

Studies generally agree that full-time students are more likely to be addicted to

the Internet, and they are considered to be at high-risk for problems because of free and

unlimited access and flexible time schedules (Chak & Leung, 2004). Other studies find

that feelings of loneliness and lack of social support, may lead students to become

addicted to the Internet (Pawlak, 2002). This special vulnerability of college students to

Internet addiction has been characterized by: (1) an increasing investment of resources

on Internet-related activities; (2) unpleasant feelings when off-line, including anxiety,

depression, and emptiness; (3) an increasing tolerance to the effects of being on-line;

and (4) denial of the problematic behaviors (Kandell, 1998). Additional negative

consequence of heavier Internet use in college students is impaired academic

performance (Kubey, Lavin, & Barrows, 2001; Niemz, Griffiths, & Banyars, 2005),

although there is no agreement in the literature (Pawlak, 2002). In Spain, a study carried

out with college students has found that only a small percentage of the participants

came near to psychopathology use or Internet addiction (Muñoz-Rivas, Perales, &

dePablo, 2003).

The first author who proposed a diagnostic definition of Internet Addiction was

K. S. Young (1996a, 1996b, 1998). Today, some authors reject Internet addiction as

being a distinct nosological item, but rather consider it a symptom of a broader group of

psychological disorders (e.g. Morahan-Martin, 2005). Other authors support the

inclusion of a new DSM-IV label that could be called "Cyberspace Addiction" or

"Computer/ Internet Addiction" or "Pathological Computer Use " (Sandoz, 2004).

Those who defend the inclusion of this label inside the addiction disorders category

emphasize the existence of correlations between Internet addiction and substance abuse,

as well as the interferences in other aspects of their lives, similar to what has been found

in other addictions (Bai, Lin, & Chen, 2001; Beard & Wolf , 2001; Brenner, 1997; Hall

& Parsons 2001). Some research even mentions other new addictions (e.g., addictions to

sex, work, TV, computers and the Internet, and religion and religious sects); this

approach considers behaviors potentially addictive (Becona, 1998). These addictions

consist of a number of distinct common components (salience, mood modification,

tolerance, withdrawal, conflict and relapse) with many additional commonalities that

may reflect a common etiology of addictive behavior; this suggests that addiction may

be a separate syndrome (Griffiths, 2000, 2005).

However, other authors (p.e. Goldsmith & Aspira, 2006; Kaltiala-Heino,

Lintonen, & Rimpela, 2004; Shapira, Lessig, Goldsmith, Szabo, Lazoritz, Gold, &

Stein, 2003; Young, 1998, 2004) consider problematic internet use to best be classified as an impulse-control disorder, similar to pathological gambling; that is, an impulse-control disorder that does not involve an intoxicant. In fact, the diagnostic criteria for the psychological disorder of Internet addiction are adapted from the criteria for pathological gambling in the APA DSM. These authors use the term "problematic Internet use", instead of "Internet addiction," and believe it can be distressing, disabling, and quite prevalent, like other impulsive disorders (Goldsmith & Aspira, 2006). Yet, empirical evidence has not found an association between Internet over use and sensation seeking or diminished impulse control (Armstrong, Phillips, & Saling, 2000) although, from a social-cognitive perspective, Internet addiction has been hypothesized to imply a self-regulation deficit (LaRose, Lin, & Eastin, 2003; LaRose, Mastro, & Eastin, 2001).

There is also a growing interest in developing appropriate self-report measures to assess new addictions (Boca & Brown, 1996). One measure to assess problematic Internet use is the Internet Addiction Scale (IAS) (Engelberg & Sjoberg, 2004). This self-report measure is based on the 7 substance dependence criteria and 2 additional criteria recommended by Griffiths (1998) (Nichols & Nicki, 2004); the measure has high reliability properties (alpha=.95) and factor analyses show its unidimensional nature. The Internet Addiction Test (IAT) (Widyanto & McMurran, 2004) has also shown adequate psychometric properties; it consists of six factors: salience, excessive use, neglecting work, anticipation, lack of control, and neglecting social life.

Yet, further efforts need to be made, given the initial stage of this research field. It is necessary to obtain additional data to help identify associate variables of problematic Internet Use, as well as its association with psychological, physical, and behavioral correlates. One of the behavioral correlates relates to another potential new behavioral addiction: cell-phone addiction or over use. In this area, there is even less

research, even though data show that (Kamibeppu & Sugiura 2005) keitai (cell-phone) over use is associate with other behavioral patterns, such as staying up late at night engaged in exchanging messages, as well as emotional dependence reflected in the thought that users could not live without their cell phone. These findings support the negative impact of over use on students' psychology and physical health.

In light of these findings, the aim of the present study was to identify patterns of pathological Internet and cell-phone use in college students, as well as to identify psychological, health, and behavioral correlates. Two measures have been developed to assess pathological Internet and cell-phone use by adapting the DSM-IV criteria for impulse control disorders, more specifically pathological gambling. Three hypothesis have been tested: (1) there will be significant association between substance abuse and excessive gambling patterns with Internet and cell-phone over use; (2) there will be significant association between clinical symptoms of depression, anxiety and other psychiatric disorders, and pathological Internet and cell-phone use; (3) there will be significant association between gender, healthy behavioral patterns, and Internet and cell-phone use.

MATERIALS AND METHODS

Participants

337 participants were surveyed from March to June, 2006. All were college students from the Universidad de Salamanca, Spain. Of the studied sample 81 (24%) were male and 252 were female (74.8%), while 4 (1.2%) did not provide this information. Ages range from 18 to 32, with a mean of 21.6 (DT=2.45). Surveyed students belonged to 47 different undergraduate programs, and 9 different graduate programs. Request for participation in the study was posted in the web page of the

University of Salamanca. All participants were anonymous and volunteers and filled

out the survey through the Internet; neither purposeful nor randomized sampling was

used. Of the participants, 93.47% (n=315) were Spaniards, 2.67% (n=9) came from

other European countries, 3.26% (n=11) from Latin-America countries, and the

remaining 0.59% (n=2) came from other countries (i.e. Canada and Morocco). Table 1

summarizes additional information.

< Insert Table 1 about here>

Design and Analysis

The present study involved the development of two instruments to assess

pathological use of the Internet and cell-phones, and which were administered along

with Beck's BDI, Beck's BAI, and the General Health Questionnaire – GHQ-28.

Routine descriptive statistics were used to analyze the sociodemographic and clinical

characteristics of the studied sample. Psychometric properties of the developed

measures were analyzed with t-test for independent samples to determine the

discriminative power of each item from the developed measures: alpha indexes

determined internal consistency of each measure. Then, chi-square tests for independent

samples were used to analyze categorical variables. On the basis of these preliminary

analyses, we performed two logistic regression analyses (González & Landero, 2006;

Jovell, 1995), with light or heavy Internet or Cell-phone use as the dependent variables,

while gender, the presence or absence of anxiety (as measured by the BAI), depression

(as measured by the BDI), and other psychiatric disorders (as measured by the GHQ-28)

were the covariates. All the statistical analyses were performed using the SPSS for

Windows software (version 11). An alpha level of 0.05 was used for the analyses.

Materials

Three existing measures, plus the two specifically developed for the present study were utilized. First, the Spanish version (Sanz and Vázquez, 1998; Sanz & Navarro, 2003) of the 1978 Beck's BDI (Beck, Rush, Shaw & Emery, 1979) was used. The cut-off score utilized in this version, and that was recommended by the original authors, is 18. Reliability properties of the measure were tested for this study, and alpha levels (alpha= 0. 88) supported its adequacy.

Second, the Spanish version of Beck's BAI (Beck, Brown, Epstein, & Steer, 1988) was utilized, with the cut-off score of 10, as suggested by some authors (e.g. Silove, Blaszczynski, Manicavasager, Tyndall, Petridis, & Hillman, 2003). The alpha index was alpha=0.87 supporting its reliability as well. This reliability index is slightly inferior to those obtained by the authors of the measure, with alpha=0.90 (Beck & Steer, 1990; Somoza, Steer, Beck, & Clarke., 1994), but slightly superior than what has been obtained in other studies (Lovibond & Lovibond, 1995).

Third, the General Health Questionnaire – GHQ-28 (Goldberg & Hillier,1979; Goldberg & Williams, 1988)   is one of the most used measures to detect morbidity in clinical and research settings (Raphael, Lundin, & Weisaeth, 1989). For the present study we have used the Spanish adaptation (Goldberg & Hillier, 1979; Lobo, Perez & Artal, 1989; López, Huizing & Lacida, 2004). The commonly used cut-off point in both clinical and non-clinical settings is 4/5 using dichotomous scoring. In the present study, alpha for the total measure was .89. Reliability indexes for the four factors ranged from .68 to .86, which is slightly inferior to other Spanish studies (e.g. Molina, Andrade-Rosa, González-Parra, Blasco-Fontecilla, Real & Pintor, 2006). Normal vs. clinical sub samples of each of the subscales of the GHQ-28 were identified according to the criteria set by the authors of the measure. Likewise, a cut-off score of 18 was selected,

as suggested in different studies (Chan, 1991; Kendall, Hollon, Beck, Hammen, & Ingram, 1987; Rudd & Rajab, 1995).

In addition, two instruments to assess pathological use of the Internet and cell-phones were developed. Given our focus on developing measures to assess excessive use rather than addiction disorders, both measures, the Internet Over-use Scale (IOS), and the Cell-Phone Over-Use Scale (COS), were based on seven of the 10 pathological gambling criteria from the Diagnostic and Statistical Manual of Mental Disorders (4th ed.; DSM–IV; American Psychiatric Association, 1994). Criteria number 6 (trying to "chase" one's losses), number 8 (committed illegal acts to finance gambling), and number 10 (relies on others to provide money to alleviate financial situation caused by gambling), were not considered.

Both measures consist of parallel forms (mainly by changing the term "Internet" for "Cell-phone") of 23 items for each of the included criteria: six from criteria 3; five from criteria number 1 and 9; three from criteria 2; two from criteria 5; and one from criteria 4 and 7. Both measures have a six-point Likert type response format, and high scores reflect higher overuse: 1= "Never", 2= "Almost never", 3="Sometimes", 4= "Often", 5="Almost always", 6= "Always". Responses are recoded as zero if equal or lower than 2 ("almost never") or as one if they are equal or higher than 3 ("sometimes"). Preliminary analyses with the complete sample were performed to identify users with five or more symptoms denoting Internet or cell-phone addiction, according to DSM criteria for pathological gambling. Additionally, percentiles 25 and 75 were used to classify participants, respectively, as light or heavy users. Table 2 includes some examples of statements from both measures. Complete measures will be provided by the authors upon request.

< Insert Table 2 about here>

According to the DSM criteria, 6.2% of the total sample (N=21) could be considered pathological users of Internet and 10.4% (n=35) matched the criteria for pathological users of cell-phones; another 3.86% (n=13) fit both criteria. When comparing light vs. heavy Internet users (N=88 and N=86, respectively) with pathological vs. non-pathological Internet users, we found that 43.9% (N=69) of non-pathological internet users were classified as heavy (i.e. cn75) Internet users, while 100% (N=17) of heavy Internet users were correctly classified as pathological Internet users. Regarding light vs. heavy cell-phone users (N=86 and N=86,respectively), 41.8% (N=61) of non-pathological cell-phone users were classified as heavy users, and 96.2% (N=25) of pathological cell-phone users were correctly identified as heavy users. In sum, it is possible to say that the studied sample includes heavy users rather than pathological ones.

The next step consisted of guaranteeing the reliability and validity properties of the developed measures (Borg & Gall, 1989). We started by analyzing the discriminative power of the items. Total scores were recoded into two groups: low use (scores under 25 percentile) and high use (scores over 75 percentile) and a T-test was then performed. All the items demonstrated their discriminative power (*p*< .01). Total reliability index for the IOS was alpha=.88, and alpha=.87 for the COS.

Procedure

An Internet based survey was developed. It contained an introductory statement informing the individual that they would remain anonymous. The survey included four sections: (1) sociodemographich information, quantitative (i.e. frequency, duration) and qualitative (i.e. type of Internet connection, type of cell-phones) data on Internet and

cell-phone usage, presence or absence of substance abuse and pathological gambling, and healthy behaviors (e.g. practicing sports, etc); (2) the Internet Over-use Scale (IOS), and the Cell-Phone Over-Use Scale (COS); (3) the Beck Depression Inventory (BDI); (4) the Beck Anxiety Inventory (BAI); and (5) the General Health Questionnaire, 28 items version (GHQ-28). Completed surveys were received in a text file for further analyses with statistical packages. SPSS Version 11.0 for Windows (SPSS Inc., Chicago, IL) was used for statistical analysis.

RESULTS

In order to test our first hypothesis, categorical variables from the first section of the survey regarding presence or absence of substance (tobacco, alcohol, substances) abuse, together with the presence or absence of excessive gambling behaviors, were used to check for potential association with high (75 percentile) vs. low (25 percentile) scores in both the IOS and the COS. Analyses with pathological vs. non-pathological samples could not be performed because of the small number of participants who matched the criteria for clinical diagnosis. Regarding low vs. high scores in the IOS, Chi-square tests showed independence between each pair of studied variables. The same procedure was employed with low vs. high scores in the COS and selected variables; Chi-square tests showed a lack of significant association between each pair of variables, as well.

The second hypothesis predicted an association between clinical symptoms of anxiety as measured by the BAI, depression as measured by the BDI, and other psychiatric disorders as measured by the GHQ-28, with light and heavy Internet and cell-phone usage. Analyses of association between light vs. heavy Internet use and selected variables showed a significant association with insomnia (χ^2 =9.938; df=1;

p=.001), social dysfunction (χ^2 =4.370; df=1; p=.037), and depression (χ^2 =5.529;

df=1; p=.008) in the GHQ-28. No significant differences were found for the somatic

complaints subscale. Data also showed significant association with non-clinical vs.

clinical scores in the BAI (χ^2 =16.248; df=1; p=.000); There was no significant

association between light vs. heavy Internet usage and non-clinical vs. clinical scores in

the BDI.

Data regarding light vs. heavy cell-phone use and selected variables showed

significant association with somatic complaints (χ^2 =5.859; df=1; p=.015), insomnia (χ^2

=13.595; df=1; p=.000), and social dysfunction (χ^2 =6.340; df=1; p=.012) in the GHQ-

28; no significant association was found regarding the depression subscale in the GHQ-

28. Data also showed significant association between cell-phone use (light vs. heavy)

and non-clinical vs. clinical BAI (χ^2 =15.500; df=1; p=.000), and BDI (χ^2 =5.326;

df=1; p=.021) scores. Table 3 shows percentages obtained for each of the analyses.

< Insert Table 3 about here>

Regarding our third hypothesis, chi-square tests between gender, and presence or

absence of healthy behaviors (sleeping enough, physical activity, practicing sports,

having leisure time) with light vs. heavy Internet use, showed a lack of association. In

analysis of cell-phone use and the previously mentioned variables, only gender was

significantly associated (χ^2 =8,616; df=1; p=.003). Data also showed that while 28.6%

of males were classified as heavy cell-phone users, 56.3% of females were classified as

heavy users.

In the light of these exploratory analyses, we performed two logistic regressions,

with Internet use and cell-phone use as dependent variables. Regarding Internet use, we

included normal vs. clinical BAI, and insomnia, social dysfunction, and depression

subscales from the GHQ-28, as the covariates. The goodness-of-fit test results for the first regression (Hosmer and Lemeshow Test: chi-square=3.3118, *df*=3, *p*=.346) showed that the model, including the four variables, was adequate, allowing for a correct classification of 68.02% of the cases, with good specificity (81.6%) but poor sensitivity (54.12%) (González & Landero, 2006). In addition, the omnibus test showed that the model was overall significant (chi-square=24.635, *df*=4, *p*<0.0001). When considering the significance levels of the predictors as well as the betas, ([exp]β; P value) only BAI scores (2.956; .017) exerted significant effects on the likelihood of being a light or heavy Internet user.

The same process was followed with cell-phone use as the predicted variable. Covariates included in the analyses were gender, somatic complaints, insomnia, and social dysfunction from the GHQ-28, and BAI and BDI clinical vs. non-clinical scores. The goodness-of-fit test results regarding light or heavy usage (Hosmer and Lemeshow Test: chi-square=2.164, *df*=5, *p*=.826) showed that the model, including the seven variables, was adequate, allowing for a correct classification of 66.86% of the cases; good specificity value was obtained (85.88%) but with poor sensitivity (47.62%). The omnibus test showed that the model was overall significant (chi-square=39.854, *df*=6, *p*<0.0001). When considering the significance levels of the predictors as well as the betas, ([exp]β; P value) gender (0.293; 0.005), BAI scores (0.291; 0.016), and insomnia (0.329; 0.025) exerted significant effects on the likelihood of being a heavy or light user of cell phone.

DISCUSSION

The main objective of the present study was to identify the presence of pathological Internet and cell-phone usage in the studied sample, as well as

psychological, behavioral and health correlates. In order to accomplish this goal, and

given the lack of consensus on the diagnosis criteria for these disorders, and the

consequent lack of measures to assess these behavioral addictions, we have developed

two measures; the IOS and COS. Data showed good reliability levels for both measures,

with alpha indexes close to .90 (George & Mallery, 2003). Construct (convergent and

discriminant) validity has also been tested by using the BAI, BDI, and GHQ-28 as

measures to differentiate non-clinical vs. clinical subsamples.

Noteworthy is the fact that 6.2% of the studied sample matched the diagnosis of

pathological Internet users, 10.4% matched the diagnosis of pathological cell phone use,

and 3.86% fit both diagnoses. Even though this study utilized a not purposeful or

randomized sample, the high rates of such pathological use deserve some attention

given the emotional dependence, lack of control, and additional social, labor,

educational and other negative impacts. Strategies for early detection of at-risk students

will help prevent later pathological disorders.

Contrary to our first hypothesis, we have found a lack of significant association

between Internet or cell-phone over-use and additional substance abuse or dependency,

as well as pathological gambling. These results seem to contradict previous studies (Bai,

Lin, et al 2001; Beard & Wolf , 2001; Brenner, 1997; Hall & Parsons 2001) and deserve

further efforts in order to better understand associations between the studied behavioral

disorders and additional diagnosis. Potential explanations could be related to the fact

that Internet and cell-phone over use or even pathological use constitute a separate

diagnosis label, not included in the impulse control disorder, or in the addiction

disorders. Rather, they constitute additional symptoms of broader disorders such as

depression, anxiety, and so on, as some authors have stated (Morahan-Martin, 2005).

Data followed our second prediction; Internet over-users are more likely to experience

additional psychiatric disorders such as insomnia, social dysfunction, depression, and anxiety. Similarly, cell-phone over-users are more likely to experience somatic complaints, insomnia, social dysfunction, anxiety, and depression. These results agree with previous studies (Kamibeppu & Sugiura, 2005).

Also interesting is the lack of significant association between healthy habits (e.g. sleep patterns) and over-use behaviors, which contradicts our third prediction. Possible explanations could be: (1) the lack of measures to assess these additional disorders and behaviors. For the present study; as we indicated previously, the presence or absence of these additional disorders was based exclusively on a checklist regarding presence or absence of each of the disorders. (2) Another potential explanation could be that students did not tell the truth, or were affected by social desirability biases. (3) The results may also reflect the fact that, as indicated, Internet and cell-phone over use constitute a separate diagnosis label, not included in the impulse control disorder, or in the addiction disorders. Further studies with specific measures to assess potential impulse control or addiction disorders will help confirm or refute this finding and help clarify the debate regarding diagnosis and classification.

Similarly, selected variables were quite poor predictors of heavy Internet or cell-phone users. Potential explanations could be related to the distribution of the studied sample in the dependent variables. Although the aim of this study did not allow us to select a purposeful sample, it is strongly recommended to replicate theses findings with a similar sample of light and heavy Internet and cell-phone users.

Some limitations need to be stressed. First, the procedure for selecting the sample did not allow us to generalize the results and prevented us from estimating prevalence of the disorders. Second, further studies need to include a larger sample of equivalent pathological Internet or cell-phone users, in order to confirm or refute the

current results. Third, additional analyses with the developed measures, will need to test for the stability of the measures, as well as their convergent and discriminant validity. For example, the combined use of existing measures to assess addictions, such us the already mentioned IAS (Engelberg & Sjoberg, 2004) or the IAT (Widyanto & McMurran, 2004) will help determine if the studied problematic behaviors could be better understood as impulse-control disorders, rather than addictions, or not. Similarly, additional measures to assess comorbidity (e.g. pathological gambling, alcohol addiction, etc.) may help us better understand potential correlates of excessive use of Internet and cell-phone. Forth, longitudinal studies need to be carried out, as well as experimental studies to help find the answers to some questions yet to be solved, as well as to help reduce these behavioral disorders. Further studies, currently in progress, will try to address these and other limitations.

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Table 1. Sociodemographic information and data on Internet and cell-phone usage

		Frequency	Percent
Type of studies			
	Undergraduate	305	90.50
	Graduate	22	6.53
	NA	10	2.97
Working part-time			
	Yes	50	14.84
	No	282	83.68
	NA	5	1.48
Behaviors			
	Smokes more than 20 cigarettes/day	17	5.04
	Substance intake	38	11.28
	Sleeps enough	243	72.11
	Excessive alcohol intake	41	12.17
	Gambling machines more than 1/week	0	0.00
	Playing lottery more than 1/week	8	2.37
	Moderate physical activity (i.e. walking fast)	239	70.92
	Sport or exercise 3 times/week	97	28.78
	Adequate leisure time	301	89.32
Frequency of Internet Use			
	Daily	211	63.36
	2-3 times/week	82	24.62
	Once/week	19	5.71
	2-3 times/month	14	4.20
	Less than 2-3 times/month	7	2.10
Duration of weekly Internet Use			
	0- 2 hrs/w	65	19.76
	3- 6 hrs/w	87	26.44
	7- 10 hrs/w	67	20.36
	11- 20 hrs/w	72	21.88
	21-40 hrs/w	23	6.99
	> 40 hrs/w	15	4.56
Reasons for Internet Access			
	Information searching for academic purposes	329	97.63
	On-line homework (e.g.. tutorship, exams, academic forum)	189	56.08
	Downloading programs/movies/music/others	226	67.06
	Communication with friends	315	93.47
	Meeting new people	25	7.42
	Information searching for personal purposes	215	63.80

	On-line purchase	37	10.98
	On-line games	36	10.68
	Other	50	14.84
Cell-phone ownership			
	More than one	45	13.60
	One	281	84.89
	No	5	1.51
Duration of daily cell-phone use			
	< 1 hr.	247	74.85
	1- 3 hrs.	68	20.61
	4- 5 hrs.	5	1.52
	> 5 hrs.	10	3.03
Reasons for cell-phone use			
	Bluetooth	63	18.69
	Chats (WAP)	2	0.59
	Downloads (games, screens, tones)	14	4.15
	MMS	64	18.99
	Phone calls	325	96.44
	SMS	326	96.74
	Video calls	3	0.89

Table 2. Examples of statements of the Internet Over-use Scale (IOS), and the Cell-

Phone Over-Use Scale (COS)

DSM's Criteria	IOS	COS
1	Do you feel preoccupied by what happens on the Internet and do you think about it when off-line?	Do you feel preoccupied about possible calls or messages on the mobile phone and do you think about if when your mobile is off?
1	How often do you anticipate your next Internet connection?	How often do you anticipate your next use of the mobile phone?
2	Do you feel the need to invest more and more time connected to feel satisfied?	Do you feel the need to invest more and more time using the mobile phone to feel satisfied?
3	How often do you try to reduce the importance of the time spent connected, even though it has been many hours?	How often do you try to reduce the importance of the time spent using the phone, even though it has been many hours?
3	Have you ever restricted your time of connection to the Internet due to a previous overuse?	Have you ever restricted your time of use of the mobile phone due to a previous overuse?
3	Have you ever tried to not use the Internet and failed?	Have you ever tried to not use the mobile phone and failed?
4	How often do you get angry or do you shout if someone tries to interrupt you when you are connected?	How often do you get angry or do you shout if someone tries to interrupt you when you are using the mobile phone?
5	Do you connect to the Internet to escape from your problems?	Do you use the mobile phone to escape from your problems?
7	Do you lie to your relatives and friends regarding the frequency and duration of your Internet connections?	Do you lie to your relatives and friends regarding the frequency and duration of your mobile phone use?
9	Have you risked an important relation, a job, an academic opportunity or a career development opportunity due to the overuse of the Internet?	Have you risked an important relation, a job, an academic opportunity or a career development opportunity due to the overuse of the mobile phone?
9	Do you refrain from going out with your friends in order to spend more time connected to the Internet?	Do you refrain from going out with your friends in order to spend more time using the mobile phone?

Table 3. Clinical characteristic of light and heavy Internet and cell-phone Users

		Internet Users		Cell-phone Users	
		Light(N=88)	Heavy (85)	Light (N=86)	Heavy (N=86)
Somatic complaints					
	Normal	80 (52.98)	71(47.02)	80(54.05)	68(45.95)
	Clinical	8(36.36)	14(63.64)	6(25.00)	18(75.00)
Insomnia					
	Normal	76(57.58)	56(42.42)	75(58.14)	54(41.86)
	Clinical	11(27.50)	29(72.50)	10(23.81)	32(76.19)
Social Dysfunction					
	Normal	86(52.76)	77(47.24)	85(52.15)	78(47.85)
	Clinical	1(11.11)	8(88.89)	0(0.00)	8(100.00)
Depression					
	Normal	85(53.46)	74(46.54)	78(50.00)	78(50.00)
	Clinical	2(15.38)	11(84.62)	7(46.67)	8(53.33)
BAI					
	Normal	78(59.54)	53(40.46)	77(58.78)	54(41.22)
	Clinical	10(23.81)	32(76.19)	9(21.95)	32(78.05)
BDI					
	Normal	86(52.44)	78(47.56)	84(52.83)	75(47.17)
	Clinical	2(50.87)	7(49.13)	2(15.38)	11(84.62)