INTERNET ADDICTION: SOME DISTURBING RESULTS FROM A SAMPLE SURVEY AMONG UNIVERSITY STUDENTS FROM GREECE

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Abstract

The aim of this paper is to estimate the prevalence of Internet addiction among Greek University students. Results of a sample survey among 1875 Greek University students, ages 18-27, are presented. The questionnaire consisted of Young's Diagnostic Test for Internet Addiction (YDTIA),[1-4] as well as an inventory that included demographic factors and questions about the relations of students with parents, teachers and friends, their academic performance and their psychological characteristics. The consistency of YDTIA was tested with Cronbach's alpha (0.71) with standardized items alpha (0.73). Results show that a) the prevalence rate is 13.12% b) Men are more addicted to the use of the Internet than women c) Academic performance, social relations and psychological characteristics of the students are impaired by the addiction to the use of the Internet d) The applications of the Internet which are most frequently used are: Chat, Sex Pages, Games, and e-mail e) Students studying more "applied" subjects, like Computer Science present a higher percentage of Internet addiction than students studying more "theoretical" subjects like Law or Business Administration.

1. Introduction

The Internet is a widely recognized channel for information exchange, academic research, entertainment, communication and sales of products.[5-8] Although everybody is praising the positive aspects of the Internet, there is a growing academic research about the negative sides of its excessive use.[9-13]
Byun et al.[5] estimate that 9 million Americans could be labeled as pathological Internet users[14-17] with unpleasant consequences in their social life, their job security and their psychological condition.
The disturbing phenomenon of Internet addiction has been recorded through academic research in USA,[18-19] South Africa,[20-21] South Korea,[22-24] Taiwan,[11, 25-27] Norway,[28] England,[29-33] Italy,[34] Greece,[12, 13, 35-37] Switzerland,[5] China,[5] and Cyprus.[38]
In Greece, Internet addiction is treated as a disorder in the Public Hospital for Children, P. & A. Kyriakou in Athens[37] and in the Center for Therapy of Dependent Persons (KETHEA, Pleusis) in Athens.
So far, no data are available about the extent of Internet addiction among Greek University students, because the previous studies[36, 37] in Greece have focused in finding the percentage of Internet addicted among students in high School of ages 12 to 18.
The aim of the present paper is to assess the prevalence of Internet addiction among Greek University students, ages 18 to 27, to examine possible gender and type of study differences and to find possible determinants of Internet addiction. For the purposes of our study, we have selected by randomized stratified selection a sample of 1875 students, ages 18 to 27 from the five Schools (SDO, STEF, SEYP, STETROD, SGTKS) of the Technological Educational Institute (TEI) of Athens (TEIA), the Technological Educational Institute (TEI) of Piraeus, Dept. of Accounting (TEIPIR), and from three Universities in Athens [Economic University, Dept. of Business Admin., 1st and 2nd semester, (ECONUN); School of Law (LAWUN) of the National University in Athens, 1st and 2nd semester; and the Agricultural University, 1st and 2nd semester (AGRICUN)]. The desirable accuracy of the sample or the maximum sampling error E, derived from the formula $n = (z_{\alpha}/2)^2/4E^2$, using Tabachnick and Fidell[39] was E = 0.02, where n = 1875, $z_{\alpha}/2 = 1.96$ is the 97.5 quantile of the Normal Distribution, and $\alpha = 0.05$.

Young's Diagnostic Test for Internet Addiction (YDTIA) has been translated into Greek and back into English by two independent translators, following the usual procedure Young's Questionnaire was applied because many other researchers have applied it in different cultures.[28] Furthermore, an evaluation of the sensitivity, specificity and diagnostic accuracy of the eight criteria of YDTIA was made.

2. Methods

The sample consisted of 1875 students (mean age 19.52±2.38) who were studying in 36 classes among 9 University and TEI Departments in Athens, Greece. We obtained the sample by the method of randomized stratified selection in every Department. A questionnaire – consisting of sociodemographic items and the eight items of YDTIA – was administered to each participant.
The sociodemographic questionnaire recorded information about gender, age, individual habits, Internet applications which are most frequently used, relations with parents, teachers, friends, psychological characteristics of the respondents, and academic performance of the respondents.
According to Beard[9] "an individual is addicted to the medium called Internet when the individual's psychological state, which includes both mental and emotional states, as well as his scholastic, occupational and social interactions, is impaired by the overuse of the medium. Broadly speaking, "addiction is a compulsive uncontrollable dependence on a substance, habit or practice to such a degree that cessation causes severe emotional, mental or physiological reactions.[40]
The YDTIA consists of eight yes or no questions about the use of Internet. Respondents who answered yes to five or more of the eight criteria were classified as Internet dependents (YID) and the rest were classified as Internet non-dependent (YIND) according to Young. In this paper, we establish a new category of Internet Users, the ones who answered 3 to 4 criteria of the YDTIA. This category was named "At-Risk Internet users" (ATRIU).The category of users who answered yes in 3 to 8 criteria was classified as "Problematic Internet Users" (YPIU).

3. Results

Characteristics of YDTIA

We carried out a Principal Component Analysis of the eight items of YDTIA. The first component had an eigenvalue of 2.71 while all remaining three components had values below 1.0. Thus the first component was selected which was explaining 33.83% of the total variance.
The eight items of YDTIA gave correlations of 0.71 to 0.70 and Spearman's correlations calculated between the eight items were statistically significant at the 0.001 level of significance ($p<0,001$).
The consistency of YDTIA was tested with Cronbach's alpha (0.71) and Cronbach's alpha based on standardized items (0.73); also the Spearman-Brown Coefficient was (0.72). Thus, the YDTIA has a good reliability, consistency, and unidimensionality. In all calculations of this paper, we used the Statistical Package for Social Science (SPSS), Version 16.0.[39]

Table 1. Sociodemographic and Academic Characteristics of the sample of University students who answered the Questionnaire.

	Positive Diagnostic Criteria (yes) in YDTIA				
			At risk Internet users	*Dependent Users*	
	0 Positive criteria N (%)	1-2 Positive criteria N (%)	3-4 Positive criteria N (%)	5-8 Positive criteria N (%)	Total N
Section 1 Gender differences	χ^2=45.38, df=3, P<0.001				
Total sample	411 (22.0%)	774 (41.5%)	438 (23.5%)	244 (13.1%)	1867
Male	164 (8.8%)	333 (17.8%)	223 (11.9%)	157 (8.4%)	877 (47%)
Female	247 (13.2%)	441 (23.6%)	215 (11.5%)	87 (4.7%)	990 (53%)

	Positive Diagnostic Criteria (yes) in YDTIA				
			At risk Internet users	*Dependent Users*	
	0 Positive criteria N (%)	1-2 Positive criteria N (%)	3-4 Positive criteria N (%)	5-8 Positive criteria N (%)	Total N
Section 2 Location of computer differences	χ^2=37.34, df=15, p<0.001				
Total Sample	399 (21.7%)	765 (41.6%)	435 (23.7%)	238 (13.0%)	1837
Home	311 (16.9%)	651 (35.4%)	374 (20.4%)	187 (10.2%)	1523 (83%)
School	23 (1.3%)	35 (1.9%)	20 (1.1%)	11 (0.6%)	89 (5%)
Internet Café	26 (1.4%)	40 (2.2%)	23 (1.3%)	20 (1.1%)	109 (5.9%)
Friend's house	30 (1.6%)	23 (1.3%)	10 (0.5%)	7 (0.4%)	70 (3.8%)
elsewhere	9 (0.5%)	16 (0.9%)	8 (0.4%)	13 (0.7%)	46 (2.5%)
Section 3 Academic Performance differences	χ^2=31.45, df=9, p<0.0001 AVEMARK = Average Mark in last Semester				
Total Sample	327 (21.1%)	634 (40.9%)	380 (24.5%)	208 (13.4%)	1549
AVEMARK<5	16 (1.0%)	26 (1.7%)	28 (1.8%)	23 (1.5%)	93 (6%)
5≤AVEMARK<6,5	116 (7.5%)	234 (15.1%)	137 (8.8%)	87 (5.6%)	574 (37.1%)
6,5≤AVEMARK<8	159 (10.3%)	325 (21.0%)	178 (11.5%)	71 (4.6%)	733 (47.3%)
8≤AVEMARK<10	36 (2.3%)	49 (3.2%)	37 (2.4%)	27 (1.7%)	149 (9.6%)
Section 4 Family Condition differences	χ^2=31.2, df=12, p<0.001				
Total Sample	410 (22%)	774 (41.5%)	436 (23.4%)	243 (13%)	1863
Married	15 (0.8%)	25 (1.3%)	16 (0.9%)	8 (0.4%)	64 (3.4%)
Single	380 (20.4%)	732 (39.3%)	408 (22%)	213 (11.4%)	1733 (93%)
divorced	15 (0.8%)	17 (0.9%)	12 (0.6%)	22 (1.2%)	66 (3.5%)

Sociodemographic and academic characteristics of the study participants

From Table 1 we conclude the following regarding gender, family condition, academic performance and location of computer of the study participants:

Gender

There is a statistically significant difference in gender for the dependent Internet users (5 to 8 positive criteria in YDTIA). Males were dependent (8.4% of the total sample) at a higher percentage than females (4.7% of the total sample). In the total sample, the dependent users were (13.1%) whereas the users at risk (3-4 positive criteria) were (23.5%). In the total sample, (88%) of the students were problematic Internet users (1 to 8 positive criteria).

Family Condition

The striking social result is that number of divorced students (66 students or 3.5% in the total sample) is almost the same as the number of married students (64 students or 3.4% in the total sample). Therefore, out of the 130 students who have been married in the past, more than 50% have been divorced. This shows that the social foundations of marriage are in form of crisis in Greece.
The total percentage of divorced students who are dependent (1.2%) and, therefore, seek through the Internet social relationship, is higher than the percentage of divorced students who are normal Internet users (0 positive criteria of YDTIA).

Academic performance

The percentage of dependent users who failed in the last semester (1.5%) is significantly higher than the percentage of normal Internet users who failed in the last semester (1.0%).
The percentage of dependent users who have achieved marks in the scale "very good" or "excellent" (6.5 to 10) is 6.3% and it is significantly lower than the corresponding percentage of the normal Internet users (12.6%).
The percentage of dependent users who failed in the last semester with mark less than 5 in the last semester (1.5%) is significantly higher than the corresponding percentage of normal users who have marks below 5 in the last semester (1.0%). Research by others reveals similar results in other countries.[33, 41-43]

Location of users Computer

The majority of users (83%) use the Internet from home. The second biggest percentage of users (5.9%) uses the Internet from Internet Cafes.

Internet Addition According to YDTIA

The frequency of Internet addicted was 13.12% and the frequency of at-risk internet users was 23.4%. The frequency of Problematic Internet Users (who present 3 to 8 criteria of YDTIA) was 36.5%.
We designated very frequent (VFIU) and frequent (FIU) Internet users, the ones who used the Internet for more than 28 hours per week and for 8 to 27 hours per week respectively. Table 2 shows the following:
a) The percentage of VFIU was 24.8% b) The percentage of FIU was 10.4%. The total percentage of problematic Internet users, calculated for the frequent users (8 hours to 27 hours per week), was 24.4%+10.4%=34.8%. This result is close to Siomos'[36] findings.

Table 2. Percentages of users classified according to positive YDTIA criteria among categories of gender and time of use of Internet per week.

		YDTIA				
		0 Criteria N (%)	1-2 Criteria N (%)	3-4 Criteria N (%)	5-8 Criteria N (%)	Total
Non frequent Internet users (0-7 h per week)	Male	73 (10.4%)	99 (14.1%)	49 (7.0%)	39 (5.5%)	260(37.0%)
	Female	152 (21.6%)	196 (27.9%)	73 (10.4%)	22 (3.1%)	443(63.0%)
	total	225 (32.0%)	295 (42.0%)	122 (17.4%)	61 (8.7%)	703(100.0%)
Frequent Internet users (8-27 h per week)	Male	61 (8.8%)	155 (22.4%)	76 (11.0%)	43 (6.2%)	335(48.0%)
	Female	66 (9.5%)	171 (25.0%)	91 (13.2%)	29 (4.2%)	357(52.0%)
	total	127 (18.4%)	326 (47.0%)	167 (24.1%)	72 (10.4%)	692(100.0%)
Very frequent Internet users (more than 27 h per week)	Male	26 (5.9%)	75 (16.9%)	95 (21.4%)	74 (16.7%)	270(61,0%)
	Female	18 (4.1%)	69 (15.6%)	50 (11.3%)	36 (8.1%)	173(39,0%)
	total	44 (9.9%)	144 (32.5%)	145 (32.7%)	110 (24.8%)	443(100,0%)

Specificity, Sensitivity and Diagnostic Accuracy of the YDTIA for the Study Participants

We consider the eight Diagnostic Criteria of YDTIA. The *sensitivity* of a Diagnostic Criterion "A" refers to the probability of a positive answer in A by participants who are addicted according to YDTIA. It measures how well A detects the addiction.

The *specificity* of a Diagnostic Criterion "A" refers to the probability of a negative answer in A by participants who are not addicted according to YDTIA. It measures how well the Diagnostic Criterion A excludes the addiction. *Diagnostic accuracy* refers to the overall probability of the detection or exclusion of the addiction due to the answer to Diagnostic Criterion A of the test.[44, 45] The *positive diagnostic accuracy* of Diagnostic criterion A refers to the percentage of participants who answered positively A and they are addicted within all the participants who answered positively in Criterion A. Finally, the *negative Diagnostic Accuracy* refers to the percentage of participants who answered negatively in A and they are not addicted within all the participants who answered negatively in criterion A. From Table 3 we find that the 4th Diagnostic Criterion of Young "Do you feel restless, moody, depressed or irritable when attempting to cut down or stop Internet use?", has the highest Diagnostic Accuracy (88.4%).

Table 3. Specificity, Sensitivity and Diagnostic Accuracy of YDTIA for the Study Participants

	Answers of addictive users		Answers of non addictive users		Sensitivity	Specificity	Diagnostic Accuracy	Positive Diagnostic Accuracy	Negative Diagnostic Accuracy
	YES	NO	YES	NO					
(1) Do you feel preoccupied with the Internet (i.e., think about previous online activity or anticipate next online session)?	201	34	478	1127	85,5%	70,4%	72,01%	29,6%	97,1%
(2) Do you feel the need to use the Internet with increasing amounts of time in order to achieve satisfaction?	196	44	290	1324	81,7%	82,0%	81,9%	40,3%	96,8%
(3) Have you repeatedly made unsuccessful efforts to control, cut back, or stop Internet use?	141	95	113	1497	59,7%	92,9%	88,1%	55,5%	94,0%
(4) Do you feel restless, moody, depressed, or irritable when attempting to cut down or top Internet use?	157	79	133	1472	66,5%	91,7%	88,4%	54,1%	94,9%
(5) Do you stay online longer than originally intended?	208	28	909	690	88,1%	43,2%	48,9%	18,6%	96,1%
(6) Have jeopardized or risked the loss of a significant relationship, job, educational, or career opportunity?	143	98	135	1472	59,3%	91,6%	87,4%	51,4%	93,8%
(7) Have you lied to family members, a therapist, or others to conceal the extent of your involvement with the Internet?	141	99	141	1465	58,8%	91,2%	87,0%	50,0%	93,7%
(8) Do you use the Internet as a way of escaping from problems or of relieving a distressed mood (e.g., feelings of helplessness, guilt, anxiety, depression)?	182	60	375	1227	75,2%	76,6%	76,4%	32,7%	76,6%

Predicting factors of Internet Addiction

We performed stepwise multiple regression analyses with Internet addiction as the dependent variable. The results showed significant t-values for Internet Use Habits (hours of Internet use daily, Mean Academic Marks in last Semester's exams, Enrollment in Unemployment Programs such as STAGE), Social conditions of participants (Marital status, Staying with parents), Location of computer (home, Internet Café), Internet Application with most frequent use (Chat, Sex pages, Games) and Demographics (Gender, Possession of Diploma for knowledge of the basics of computer, such as ECDL). The results are presented in Table 4.

Table 4. Stepwise Regression Analyses with Internet Addiction, according to YDTIA, as the Dependent Variable.

Variables	Step	R^2	B	S.E.	Beta	t	p
Habits of use							
Hours of use of Internet daily	1	0,015	-0,025	0,003	-0,206	-7,77	0,000
Mean Academic mark in last semester	2	0,028	0,012	0,012	0,060	2,26	0,001
Enrollment in Unemployment Programs (Stage)	3	0,080	0,168	0,032	0,161	5,29	0,001
Social Conditions							
Marital Status	1	0,008	-0,113	0,030	-0,088	-3,76	0,000
Staying with parents	2	0,010	-0,027	0,014	-0,044	-1,88	0,000
Location of Computer	3	0,015	-0,017	0,008	-0,048	-2,05	0,000
Internet Application							
Sex	1	0,083	-0,043	0,007	-0,167	-6,076	0,000
Chat	2	0,124	-0,060	0,008	-0,192	-7,028	0,000
Games	3	0,135	-0,027	0,007	-0,114	-4,178	0,000
Demographics							
Gender	1	0,015	0,076	0,016	0,117	4,83	0,000
Possession of Diploma ECDL certifying knowledge of Computer	2	0,025	-0,033	0,012	-0,069	-2,83	0,000

4. Discussion

Interpretation of results concerning Internet Addiction among Greek college students

Excessive use of the internet is related to the psychosocial health of the user, as Oczan and Buslu point out.[46, 47] Often there is a psychopathology in the person that justifies his dependence from the Internet and this is shown by the coexistence of Internet dependence with other psychiatric disorders. Young and Rodgers[48] found a negative correlation between problematic use of the Internet and depression, while Kraut[49, 50] indicates a positive correlation between problematic use of the Internet and depression with loneliness and a negative correlation with perceived social support. Moraha-Martin and Schumacher[51] also describe a positive correlation between problematic use of the Internet and loneliness.

But the coexistence of psychiatric disorders is not adequate enough to lead to Internet dependence. The coexistence of psychiatric disorders, in combination with negative beliefs (maladaptive cognitions) of the individuals, are merged into a theory proposed by Davis,[52] to create Internet dependence. The theory argues that in order to become dependent on the internet there must first be a **distal contributory cause** (necessary). This is usually a pre-existing psychiatric disorder such as depression, another dependency, social phobia, etc. This reason alone may not lead to the development of Internet dependence. However, a **second necessary distal contributory cause** is the introduction of the Internet and the discovery of a special function of it by the person. A positive result from this operation will reinforce repeated use of this special function. Then, a **proximal sufficient cause** is the trigger that will ultimately create the symptoms of Internet dependence, as described by Young.[2] This cause is usually low self-esteem, a negative view of the world etc.

For this reason, during our systematic study of Internet dependence, we investigated the causes mentioned above. In this study we found that Internet dependent persons had began using the internet earlier than the non-dependent in most occasions.[12, 13] Also, we noticed that dependent users of the Internet were generally more disappointed with life and themselves than non-dependent Internet users. Overall, we identified that the second necessary cause is necessary and sufficient cause in the near .according to Davis.[52]

Interpretation of individual observations

Why is there a gender difference among internet dependents?

We found that Internet dependents are more likely to be males than females. One possible interpretation of this may lie in the process of socialization, which depends on gender. In some cultures, men are raised in

such a way as to know technology more than women. In Greece, a Mediterranean country, males are considered to be more superior from a social-status point of view. Thus, men probably deal more with technological fields – such as the Internet, as well as with other technical fields.[38]

How is the existence of negative beliefs explained?
The Internet dependent users feel abandoned by everyone, frustration and loneliness more than the non-dependent user; they lack social support. This shows the importance of social support in the development of Internet dependence. The fact that students are still in the period of puberty and have just left their homes for their studies, where they lived with their families, is considered to have contributed to this result. It seems likely that the use of the Internet becomes problematic at a period when the student is deficient of social support, both developmentally and from a learning point of view, and thus turns to the Internet for social support. This interpretation is supported by the fact that the percentage of Internet dependents is higher in the ages 18-20, which is the age during which enrollment in University occurs. In the age range 18-20, we observed more Internet dependents than non-dependents users.

How can we explain the addictive behavior?
Problematic Internet users experience negative feelings such as withdrawal from social life and feel unproductive because of their excessive use. At the same time though, they also experience positive emotions from this excessive use, such as more qualified, more social and more comfortable, and these positive feelings play a reinforcing role. This situation is indicative of the conflict described in many addictions. On the one hand, the person is harmed by the substance or behavior that he is addicted to, and he experiences the enhancing emotional changes that lead to the recurrence of the addictive behavior or the repeated use of the addictive substance.

Concluding Remarks

Whereas Internet is a widely used medium for global communication, academic research, entertainment and commercial activities, many authors point out the dangers from an excessive use of Internet and other technological inventions such as the mobile phone, video games, playing television and gambling.[10, 12, 30, 55]
The central finding of our study is that the prevalence of Internet addiction among University students in Greece is 13.12%, in a sample of 1875 participants (8.4% among males, 4.7% among females).
Siomos[36] has estimated the prevalence of Internet addiction among Greek adolescents (12-18 years of age) and he has found 8.2% (6.2% for males and 2% among females). The results of our study are the first given, concerning Greek University students. Viewing Internet addiction as a matter of growing concern we defined the category of at-risk Internet Users as the ones fulfilling 3 to 4 criteria of YDTIA. The percentage of ATRIU is 23.5% (11.9% for males and 11.5% for females). We defined, also the problematic Internet Users as the ones who fulfill 3 to 8 criteria of YDTIA. The percentage of them is 36.5% (20.4% for males, 16.2% for females).
It is important to determine the factors which predict the new disturbing technological addiction of Internet excessive use. Those factors are home use, Internet Café use, Academic performance, Internet applications, such as Chat, Sex -pages and Games, and Demographics, such as Gender and Knowledge of basic Computer applications – as certified by the Diploma ECDL. A new result of this study is that the unemployment Status of a student and, therefore the greater lack of security regarding the future employment situation of him, as well as, the marital status of his are strong predictors of Internet Addiction. Also, the type of academic Department (Computer Science, School of Technological Applications) is a strong predictor of Internet Addiction.[12, 13]
Internet addiction is an emerging technological addiction[29] with far reaching consequences, because of the widespread use of this medium. Young[4, 17, 48, 54] has addressed the question of whether or not the Internet can be addictive, and the extent of problems associated with its misuse. The DSM-IV[44] criteria for pathological gambling were modified to develop an eight-item questionnaire, referred as YDTIA, since pathological gambling was viewed to be the closest in nature to pathological Internet use.
In our research we found that the percentage among Greek University Students at risk and problematic Internet users is quite high. This is a quite worrisome result. There is a need for further research in the casual mechanisms of this behavioral addiction. Also, there is a need for a campaign to inform Parents, Teachers and State Officials about the dangers of Internet which are gambling, trafficking of pornographic material, women and children for sexual abuse purposes,[50, 55-57] Cybersex and Cyberbullying.[7] Further research could

be carried out on other simultaneous addiction of Internet users such as alcoholism, smoking and taking drugs.

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