# Problematic Internet Use among Greek University Students: An Ordinal Logistic Regression with Risk Factors' Negative Psychological Beliefs, Pornographic Sites and Online Games

### Christos C. Frangos, BSc, MSc, PhD

Professor, Department of Business Administration
Technological Educational Institute (TEI) of Athens, Greece

#### Constantinos C. Frangos, MD

Division of Medicine, University College London, London, UK

#### Ioannis Sotiropoulos, BSc, PhD

Ass. Professor, Department of Finance and Auditing
Technological Educational Institute (TEI) of Epirus, Greece

#### Running title:

PIU in Greek university students

#### **Corresponding Author:**

Constantinos C. Frangos University College London 109 Camden Road NW1 9HZ London, United Kingdom Tel. +447960340489

e-mail: Constantinos.Frangos.09@ucl.ac.uk

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#### **Abstract**

The aim of this paper is to investigate the relationships between Problematic Internet Use (PIU) among university students in Greece and factors such as gender, age, family condition, academic performance in the last semester of their studies, enrollment in unemployment programs, length of time of Internet use per week (in general and per application), additional personal habits or dependencies (number of coffees, alcoholic drinks drunk per day, taking substances, cigarettes smoked per day) and negative psychological beliefs. Data were gathered from 2358 university students from all over Greece. The prevalence of PIU was 34.7% in our sample and PIU was significantly associated with gender, parental family status, grade of studies during the previous semester, staying or not with parents, enrollment of the student in an unemployment program, whether the student paid the subscription to the Internet (p<0.0001). On average, problematic Internet users use MSN, forums, YouTube, pornographic sites, chat rooms, advertisement sites, Google, Yahoo!, their e-mail, ftp, games and blogs more than non-problematic Internet users. PIU was also associated with other potential addictive personal habits of smoking, drinking alcohol drinks or coffees, and taking drugs. Significant risk factors for PIU were male gender, enrolment in unemployment programs, presence of negative beliefs, visiting pornographic sites and playing online games. Thus, PIU is prevalent among Greek university students and attention should be given to it by health officials.

#### Introduction

The Internet has become an indispensable tool for communication, academic research, information and entertainment. Research supports that it could fulfill needs for social recognition, social support, and a sense of belonging not currently present in a person's immediate social world. Paradoxically, though, heavy users of the Internet are described as individuals who lack confident social skills and tend to be isolated. The extreme psychological dysfunction encountered with Internet use has been labeled *Internet addiction* (IA).<sup>1, 2</sup>

There has been a certain amount of literature discussing whether IA or Problematic Internet Use (PIU) is a more appropriate term to use.<sup>3, 4</sup> Beard and Wolf<sup>6</sup> define PIU as "use of the Internet that creates psychological, social, school, and/or work difficulties in a person's life." They continue by saying that "Internet addiction has been used to describe problematic [Internet] use... We believe that terms such as 'excessive,' 'problematic,' or 'maladaptive' Internet use are most optimal for describing this behavior as they involve fewer theoretical overtones than terms such as 'Internet addiction.'" Caplan<sup>6</sup> further substantiates this argument and adds the necessary presence of maladaptive cognitions and behaviors involving Internet use that result in negative academic, professional, and social consequences. Moreover, he supports that "the term problematic refers to usage reflecting a specific cycle of innate dysfunction leading to Internet use that in turn exacerbates the dysfunction." Although he differentiates it from the word pathological, used by Davis<sup>7</sup>, he also believes that IA is a misnomer. Thatcher et al.<sup>8</sup> discuss the wider generality of PIU over IA rather eloquently:

"In recent years there have been a wide variety of investigations examining the 'addictive' use of the Internet and the predictors of Internet addiction in studies from around the world. A great deal of the debate has centred on whether the Internet is indeed 'addictive' given that there is no psychiatric classification for 'addictions' in the DSM-IV. Instead, there has been a proliferation of terms to describe the 'overuse' or 'abuse' of the Internet. Terms used have included 'unregulated Internet use', 'compulsive Internet use', 'Internet dependence', 'excessive Internet use', 'pathological Internet use', and 'problematic Internet use'. Alternatively, some researchers argue that a person's overuse or abuse of the Internet is a behavioural manifestation of other things that may be problematic in their lives."

In this study, we have selected the term 'problematic Internet use' as it particularly avoids sensitive or controversial qualities that accompany terms such as "addiction" and "pathology." We shall follow the classification suggested by Siomos et al.<sup>9</sup> and Johannson and Götestam<sup>10</sup>: Internet users who answer "Yes" to 5-8 questions from Young's Diagnostic Test for Internet Addiction<sup>11</sup> are "Internet addicted" and users who meet 3-4 diagnostic criteria are "At-Risk Internet users." *And PIU is defined as IA plus at-risk Internet use (ARIU)*.

Several studies have examined the relationship between PIU and gender, age, academic performance, location of computer, excessive use of Internet and psychological attitudes.<sup>12</sup> University students are considered a high risk group for PIU<sup>13-15</sup>; possible reasons for this are that (a) students have huge blocks of unstructured time, (b) schools and universities provide free and unlimited access to the Internet, (c) students between18 and 22 years are for the first time away from parental control without anyone monitoring or censoring what they say or do online, (d) young students experience new problems of adapting to university life and finding new friends, (e) students receive full encouragement from faculty and administrators in using the different applications of the Internet, (f) adolescents are more trained to use the different applications of technological inventions and especially the Internet, (g) students desire to escape university sources of stress resulting from their obligations to pass the exams, to deliver essays and to fulfill their purpose of getting their degrees in the prescribed time with reasonable marks, and finally, (h) students feel that university life is alienated from social activities and when they finish their studies, the job market, with all its uncertainties is a field where they must participate and succeed in getting a job.<sup>16</sup>

PIU among university students in Greece has not been studied. The aim of this sample survey was to measure the prevalence of PIU and to identify the risk factors of PIU for students who are studying in certain universities in Athens and other cities of mainland Greece. For this purpose, we examined whether students' gender, age, family condition, academic performance in the last semester of their studies, enrollment in unemployment programs, length of time of Internet use per week (generally and per application), additional personal habits or dependencies (number of coffee or alcoholic drinks or cigarettes consumed per day and daily frequency of taking substances), and negative psychological beliefs are associated with PIU and are possible risk factors of PIU.

#### Methods

#### **Participants**

The sample survey was conducted among a sample of 2358 students, drawn randomly from the National & Kapodistrian University of Athens, the Agricultural University of Athens, the Athens University of Economics and Business, the Technological Educational Institute (TEI) of Athens, the TEI of Piraeus, and the TEI of Epirus in Northern Greece. Sixty five students didn't give their age and were excluded from our analysis, leaving a sample of 2293 students. Forty six percent (46.4%) were male and 53.4% were female. Thirty five percent (35.1%) of students were 18-20 years old, 37.7% of students were 20-22 years old, 17.4% of students were 22-24 years old and 9.9% were over 24 years old.

#### The Questionnaire

Students were asked to complete an anonymous questionnaire consisting of the following six parts: (a) demographic elements, (b) general questions on computer and Internet use, (c) time used for general Internet use per week, for the past years and of various online applications per week, (d) Problematic Internet Use Part [condition of relations with parents, teachers, friends and fellow students and Young's Diagnostic Test of Internet Addiction (YDTIA)<sup>11</sup>], (e) psychological beliefs of Internet users, and (f) additional personal habits or dependencies.

In the present survey, a priori theoretical assumptions about the nature of the expected factors of our questionnaire were available from previous studies.<sup>7, 11, 17</sup> Items were collected from these studies on PIU and rephrased as outcome expectations (i.e., "Assess on a scale from 1-7 to what extent the use of the Internet has affected your daily schedule, where 1 is extremely positive and 7 indifferent). These statements were classified into 4 factors: Factor 1: Impact of Internet use on daily activities (IMPINT), Factor 2: YDTIA, Factor 3: Time Scale of Internet Use (TSIU), Factor 4: Negative Psychological Beliefs (NPB); we subjected them to confirmatory factor analysis (CFA) with Amos 16.0. The results of CFA showed that the variables were not orthogonal to each other but they were related to some degree. Figure 1 illustrates the four-factor CFA model and explanations for all variables and factors in the figure are given in Online Table 1.

The overall model fit was assessed using the root mean square error of approximation (RMSEA) and the comparative fit index (CFI). The chi-square test was not used as a measure of fit since it is very sensitive to sample size and almost always indicates a poor fit when a large number of estimated parameters are used. The CFI (0.83) and RMSEA (0.051) both indicated a good fit for the model.<sup>18</sup>

Problematic Internet Use Diagnostic Test

Thus, CFA showed that our hypothesis of the four factors created a satisfactory model. This enabled us to construct a Problematic Internet Use Diagnostic Test (PIUDT), consisting of the following domains, based on the theoretical assumption of PIU in the Introduction:

- a) Problematic Internet Use Domain (PIUD). This domain consisted of two subparts. The first subpart (Factor 1 from CFA: IMPINT) contained questions in a Likert type scale from one to seven, concerning the degree of influence of Internet use in various daily aspects of the subject's personal life (8 items). The second subpart (Factor 2 from CFA: YDTIA) contained the 8-item Diagnostic Test of Internet Addiction developed by Young.<sup>11</sup>
- b) Time Scale of Internet Use (TSIU) Domain (Factor 3 from CFA: TSIU). (14 items)
- c) Negative Psychological Beliefs (NPB) Domain (Factor 4 from CFA: NPB). (8 items)

  Table 1 contains the coefficients of internal consistency and reliability for the three domains of the PIUDT. These were from good to excellent for PIU and TSIU, and acceptable for NPB. 19 The

Statistical Analysis

items of each domain are mentioned in Online Table 1.

Group differences in categorical variables were analyzed using the chi-square test. Subsequently, ordinal logistic regression with a Logit link was used to analyze the association between the multiple risk factors and PIU. Variables with p<0.05 in the univariate analyses were included in the multivariate models and we retained those variables which produced at least one beta estimate significantly different from zero. Ordinal logistic regression was chosen because PIU classification consisted of three categories, with increasing severity of values (non-problematic Internet users=0, at-risk Internet users=1, Internet addicted users=2). Logit is the most commonly used link and it allows us to produce odds ratios by exponentiation of the model estimates. Negative estimates of the independent variables show that one value of an independent variable compared to its

following value is more likely to receive lower values on the ordinal dependent variable, and vice versa for positive estimates.<sup>20</sup> The predefined control group was the Internet addicted group.

#### Results

#### Demographics

All percentages and chi-squares with p-values for demographic variables are presented in Online Table 2. All demographic variables (gender, parental marital status, mark of studies during the previous semester, staying with parents or not, enrollment in an unemployment program<sup>21</sup>, personal payment of Internet subscription) correlated with PIU (p<0.0001). A greater percentage of men were problematic Internet users than women (42.1% vs. 27.7%); more divorced parents had spawns problematic Internet users than married or not married parents, while a greater percentage of students not living with their parents were more Internet addicted than those living with their parents. Moreover, people enrolled in the unemployment programs (STAGE) were more likely to be problematic Internet users than students who weren't enrolled in these programs and this occurred with students who personally paid for their Internet subscriptions.

The time of weekly use of certain Internet websites and applications correlated significantly with PIU (p<0.0001) (Online Table 3). On average, we can see that problematic Internet users use MSN, forums, YouTube, pornographic sites, chat rooms, advertisement sites, Google, Yahoo!, their e-mail, ftp, games and blogs more than non-problematic Internet users. Moreover, PIU was significantly associated with other personal habits/dependencies of smoking, drinking alcoholic drinks or coffee, and taking drugs (Online Table 4). On average, Internet addicted users and at-risk Internet users would consume in the categories of quantities '4 to 5,' '6 to 7,' and 'more than 7,' bigger quantities of alcohol drinks, coffee, and cigarettes and would use drugs three times more often than non-problematic Internet users.

#### Problematic Internet Use

The prevalence rate of IA in our sample of 2293 students was 12.0% while at-risk Internet users made up 22.7% (thus 39.7% problematic Internet users) and 64.5% were non-problematic Internet users. The prevalence of IA for students at the TEI of Athens was 10.9%, whereas for students of

the TEI of Epirus, which is located in a remote and one of the poorest regions of Europe, the IA percentage was 13.6%.

#### Ordinal Logistic Regression

The results of ordinal logistic regression are shown in Table 2. All models presented a good fit (p<0.0001), the test of parallel line could not reject the null hypothesis (p>0.05) and the Pearson chi-square goodness-of-fit measure was always non-significant--suggesting a good fit. These summary measures suggest satisfactory ordinal logistic regression models.<sup>20</sup>

Significant risk factors of PIU were gender and enrollment in the unemployment STAGE program. From the time of Internet use, a significant risk factor was daily hours of Internet use. After a certain degree of hours the p-values are over 0.05; we see that beta estimates tend to increase, although the evidence is not sufficient to say that they are different from zero. YouTube use was a risk factor along with online games, pornographic sites and chatting. For online games, the estimate for its fifth value ( $7 \le h < 9$ ) (beta estimate = 0.961, p=0.003) is significantly different from zero, showing that this value is associated with higher values on the scale of PIU (virtually, at-risk Internet users and Internet addicted users). Significant risk factors of PIU were all negative psychological beliefs, which presented negative estimates, showing that the answer No (x=0) is associated more with lower values in the scale of PIU, which are non-problematic Internet users (x=0). Hence, Yes answers (x=1) for the presence of negative psychological beliefs are associated with higher levels of PIU. Finally, two additional risk factors of PIU are drinking coffee and the number of cigarettes consumed daily.

#### **Discussion**

We performed a cross-sectional study of university students in Greece to estimate the prevalence of PIU. Our most important result was that the prevalence of IA and PIU was 12.0% and 34.7%, respectively. Additionally, PIU was associated with male gender, divorced parental condition, low marks during the previous semester, not staying with parents, enrollment of the student in an unemployment program, and the student paying for his own subscription to the Internet (p<0.0001). On average, we can see that problematic Internet users use MSN, forums, YouTube, pornographic sites, chat rooms, advertisement sites, Google, Yahoo!, their e-mail, ftp, games and

blogs more than non-problematic Internet users. And finally, PIU was associated with other potential addictive personal habits like smoking, drinking alcohol or coffee, and taking drugs in addition to negative psychological beliefs. We performed ordinal regression models to examine if PIU could be predicted by the variables presenting a significant association with it in univariate analyses. Because of the cross-sectional nature of this study, our results should be interpreted more as associations rather than causal relationships, something that could be deducted from an experimental prospective study of university students. Nevertheless, this study adds to the growing body of evidence on PIU, and we would like to suggest some explanations for our observed results.

Ordinal regression showed that male gender was a risk factor for PIU. This observation corroborates the findings of others. 11, 22-24 Tsai et al. 24 give a satisfactory explanation for this gender difference and denote that the more visual nature of men compared to women--with respect to sexual fantasies--leads them to see more pornographic sites. This has been facilitated by a significant decrease in bandwidth costs over the last few years. Truly, we found that pornographic sites were significantly associated with PIU and ordinal regression showed that it was a risk factor for PIU. Moreover, many other researchers have repeatedly written that women use the Internet mostly for social purposes and males for downloading programs, getting information, and for *sex purposes*. 16, 25-27 The other possible factor increasing the percentage of PIU among males is the increased frequency of previous online gaming and online gaming addictions in male adolescents compared to that among females. 28 The lower percentage of PIU among female college students is explained by the fact that they often receive more family supervision than males, preventing them from spending as much time as men on the Internet. 24

Bad academic performance was also significantly associated with PIU. This probably occurs because of lack of sleep since the user stays awake during late night hours in order to surf through various web pages. The lack of sleep causes lack of concentration and loss of interest in everyday lectures, resulting in reduced reading of the course material and eventually bad marks during the exam period. 11, 16, 29 Concerning the use and time patterns of Internet applications (games, chatting, e-mail), frequency of their use by problematic Internet users is higher than the frequency of use by healthy Internet users; in particular, viewing sex pages, chatting and viewing YouTube were risk

factors for PIU. <sup>11, 23, 30</sup> Negative psychological beliefs (feelings of loneliness, deep disappointment in life, being abandoned, a sense that everything in life is trivial, an absence of objectives in life, whether the only purpose in life is enjoyment, the tendency of giving up on solving problems, and a weak will to work) were all significant risk factors for PIU. It is a question, though, whether negative psychological beliefs cause PIU or are a result of it. The cognitive behavioral model suggests that they pre-exist PIU as a distal cause<sup>7</sup> and the appearance of PIU causes them to become more intense (rich-get-richer model). Kim et al. <sup>31</sup> suggest, however, that the relationship between loneliness and PIU is possibly birectional and excessive and compulsive use of the Internet can cause psychosocial dysfunctions as well.

Finally, two new important results arise from our analysis. Ordinal regression showed that enrollment in unemployment programs (STAGE) and the presence of other potentially addictive habits (smoking and drinking coffee) are risk factors for PIU. Moreover, chi-square tests showed that these factors along with drinking alcoholic and taking drugs were significantly associated with PIU. Binge drinking has been associated with unemployed males<sup>32</sup> and this could be the link between PIU and unemployment. Possible explanations involve either common antecedent factors that promote vulnerability to the coexistence between drug use or the presence of other personal habits/dependencies and PIU, and that they represent different conditions along a spectrum of related disorders of addiction. However, these possible antecedent or vulnerability factors linking PIU and substance use disorders still remain elusive. This coexistence of PIU with other personal habits/dependencies is a similar pattern to that observed in the coexistence of pathological gambling and substance abuse. Although this parallelism might be unequal, it is useful to draw upon it as an example, in order to seek aetiological factors.<sup>33</sup>

In conclusion, our study presents limitations in that it doesn't elucidate the mechanism of risk factors associated with PIU. Thus, a causal relationship cannot be confirmed, but only hypothesized. However, a possible profile of the PIU student stems from this study: a male subject who spends increased hours daily on chatting, gaming, and pornographic sites results in significant psychological distress and functional impairment.

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#### **Author Disclosure Statement**

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Address reprints request to:
Constantinos C. Frangos
University College London
Ifor Evans Hall Site
109 Camden Road, NW1 9HZ
London, United Kingdom

e-mail: Constantinos.Frangos.09@ucl.ac.uk

**Tables**Table 1. Coefficients of Internal Consistency and Reliability for PIUDT.

Domains of PIUDT	Cronbach's alpha coefficient	Standardized item alpha coefficient	Guttman Split – half coefficient	Spearman – Brown coefficient	No. of items
PIU domain	0.817	0.723	0.919	0.919	16
TSIU domain	0.831	0.854	0.825	0.826	14
NPB domain	0.671	0.685	0.700	0.700	8

## **Figures**

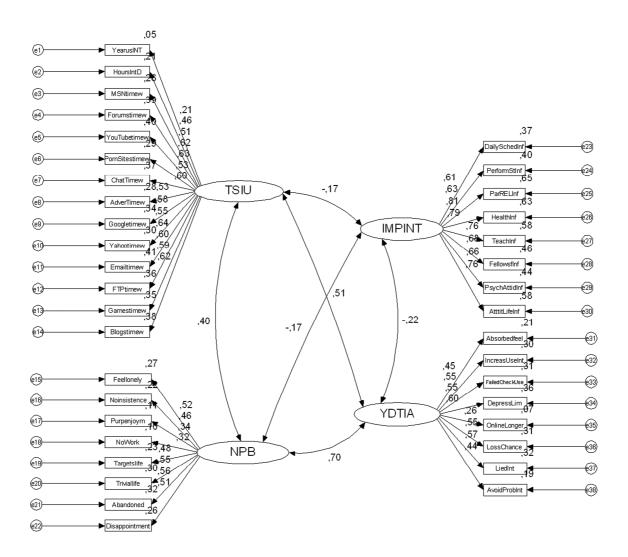


Figure 1. Confirmatory factor analysis diagram. Chi-square = 4639.9, Degrees of freedom = 659, p< 0.0001. Explanations for the acronyms are given in Online Table 1

Table 2. Ordinal regression results and the risk factors of PIU.

Variables	Logistic coefficient	Standard error	P value	Odds Ratio	95% CI
	Model Fit: chi-squ	are = 73.01 (p < 0.0)		lel Lines: chi-square	
Demographics	(p=0.082); Goodn = 6.251 (p=0.181)		on chi-square = 6.1	51 (p=0.188) ii) Dev	riance chi-squar
Gender					
Female (x=0)	-0.689	0.094	p<0.0001	0.50	0.42-0.60
Male (x=1)	Ref		-		
Unemployment progr	ams				
No (x=0)	-0.713	0.160	p<0.0001	0.49	0.36-0.67
Yes(x=1)	Ref.		-		
				allel Lines: chi-squar	
Internet Use			on chi-square = 16	70.87 (p=0.031) ii) D	eviance chi-
	square = 1626.49	(p = 0.136)			
Daily hours of Interne	et use				
h < 0.5 (x=1)	-1.188	0.272	p<0.0001	0.30	0.18-0.52
$0.5 \le h < 1 \ (x=2)$	-1.184	0.263	p<0.0001	0.30	0.18-0.51
$1 \le h \le 2 (x=3)$	-0.837	0.269	p = 0.002	0.43	0.26-0.73
$2 \le h < 3 (x = 4)$	-0.921	0.269	p = 0.001	0.40	0.23-0.68
$3 \le h \le 4 (x = 5)$	-0.546	0.272	p = 0.045	0.58	0.34-0.99
$4 \le h < 5 \ (x = 6)$	-0.405	0.281	p = 0.149	0.67	0.38-1.16
$5 \le h < 6 (x=7)$	-0.240	0.295	p = 0.415	0.79	0.44-1.40
$6 \le h < 7 (x = 8)$	-0.532	0.341	p = 0.119	0.59	0.30-1.15
$7 \le h < 8 \ (x=9)$	0.126	0.360	p = 0.728	1.13	0.56-2.30
$8 \le h < 9 \ (x=10)$	-0.320	0.498	p = 0.521	0.73	0.27-1.93
$9 \le h < 10 (x = 11)$	0.958	0.520	p=0.065	2.60	0.94-7.23
h≥10 (x=12)	Ref		F		
Pornographic sites (h/					
0≤h<1 (x=1)	-0.887	0.233	p<0.0001	0.41	0.26-0.65
$1 \le h < 3 \ (x=2)$	-0.514	0.260	p=0.048	0.60	0.36-0.99
$3 \le h < 5 (x = 3)$	0.325	0.320	p=0.309	1.38	0.74-2.59
$5 \le h < 7 (x = 4)$	0.364	0.387	p=0.347	1.44	0.67-3.07
$7 \le h < 9 (x = 5)$	0.341	0.407	p=0.402	1.41	0.63-3.12
$h \ge 9 (x=6)$	Ref	0.407	p-0.402	1.71	0.05-5.12
Online Games (h/wee					
$0 \le h < 1 \text{ (x=1)}$	-0.182	0.243	n=0.452	0.83	0.52-1.34
	0.131	0.252	p=0.453 p=0.603	1.14	0.32-1.34 0.70-1.87
$1 \le h < 3 \ (x=2)$					
$3 \le h < 5 (x=3)$	0.332 -0.005	0.267 0.295	p=0.213 p=0.987	1.39 0.99	0.83-2.35
$5 \le h < 7 (x = 4)$					0.56-1.78
$7 \le h < 9 (x = 5)$	0.961	0.326	p=0.003	2.61	1.38-4.96
h≥9 (x=6)	Ref				
Chatting (h/week)	1 002	0.077	.0.0001	0.25	0.21.0.62
$0 \le h < 1 \ (x=1)$	-1.003	0.277	p<0.0001	0.37	0.21-0.63
1≤h<3 (x=2)	-0.724	0.290	p=0.013	0.49	0.27-0.86
$3 \le h < 5 (x=3)$	-0.433	0.309	p=0.161	0.65	0.35-1.19
$5 \le h < 7 (x = 4)$	-0.293	0.336	p=0.383	0.75	0.39-1.44
$7 \le h < 9 (x = 5)$	0.305	0.369	p=0.410	1.36	0.66-2.80
h≥9 (x=6)	Ref				
YouTube (h/week)					
$0 \le h < 1 \ (x=1)$	-0.618	0.234	p=0.008	0.54	0.34-0.85
$1 \le h < 3 \ (x=2)$	-0.332	0.226	p=0.142	0.72	0.46-1.12
$3 \le h < 5 (x=3)$	-0.294	0.234	p=0.209	0.75	0.47-1.18
$5 \le h < 7 (x = 4)$	-0.265	0.244	p=0.279	0.77	0.48-1.24
$7 \le h < 9 (x = 5)$	-0.382	0.287	p=0.183	0.68	0.39-1.20
h≥9 (x=6)	Ref		•		
Negative		are = 386.49 (p < 0.6)	0001); Test of para	allel Lines: chi-squar	e = 4.951
psychological beliefs	(p=0.763); Goodn square = 518.90 (	ess-of-Fit: i) Pearso p=0.002)		6.61 (p=0.108) ii) De	
Do you feel lonely an	d you need protecti	on?			
No (x=0)	-0.661	0.122	p<0.0001	0.52	0.41-0.65
Yes(x=1)	Ref		_		
Whenever you face di	ifficult problems. vo	ou don't insist in s	olving them and	leave them?	
No (x=0)	-0.561	0.117	p<0.0001	0.57	0.45-0.72
Yes (x=1)	Ref		F	- · · ·	
	ne purpose of life is				

Variables	Logistic	Standard	P value	Odds Ratio	95% CI
v artables	coefficient	error			
No (x=0)	-0.522	0.104	p<0.0001	0.59	0.48-0.73
Yes (x=1)	Ref				
Do you find out that yo	ou don't want to wo	ork?			
No (x=0)	-0.433	0.103	p<0.0001	0.65	0,53-0.79
Yes $(x=1)$	Ref		_		
Do you find out that yo	ou don't have object	tives in your life?	?		
No (x=0)	-0.489	0.115	p<0.0001	0.61	0.49-0.77
Yes(x=1)	Ref		-		
Do you believe that eve	erything in life is t	rivial?			
No (x=0)	-0.546	0.130	p<0.0001	0.58	0.45-0.75
Yes(x=1)	Ref		-		
Do you believe that you	u have been aband	oned from everyt	ody?		
No (x=0)	-0.464	0.154	p=0.003	0.63	0.46-0.85
Yes(x=1)	Ref		•		
Do you have a deep dis	sappointment from	your life?			
No (x=0)	-0.470	0.136	p=0.001	0.62	0.48-0.82
Yes(x=1)	Ref		•		
Other personal				allel Lines: chi-squar	
habits or			on chi-square = 60.	99 (p=0.301) ii) Dev	iance chi-square
dependencies	= 62.86 (p=0.246)				
Coffees drunk per day					
0 to 1 $(x=1)$	-1.450	0.325	p<0.0001	0.23	0.12-0.44
2  to  3  (x=2)	-1.252	0.319	p<0.0001	0.29	0.15-0.53
3  to  4  (x=3)	-0.941	0.330	p=0.004	0.39	0.20-0.75
4  to  5  (x=4)	-0.069	0.367	p=0.850	0.93	0.45-1.91
6 to $7(x=5)$	0.000	0.399	p=0.999	1.00	0.46-2.18
More than $7 (x=6)$	Ref				
Cigarettes smoked per	day				
0 to 1 (x=1)	-0.832	0.230	p<0.0001	0.44	0.28-0.68
2 to 3 (x=2)	-0.595	0.251	p=0.018	0.55	0.34-0.90
3 to 4 (x=3)	-0.650	0.243	p=0.008	0.52	0.32-0.84
4 to 5 $(x=4)$	-0.215	0.239	p=0.369	0.81	0.50-1.29
6 to 7 (x=5)	-0.395	0.260	p=0.129	0.67	0.40-1.12
More than $7 (x=6)$	Ref				

Online Table 1. Explanations to the acronyms used in Figure 1.

TSIU	Time Scale of Internet Use
YearusINT	Time of use of Internet in years
HoursIntD	Hours of Internet daily use
MSNtimew	Time of use of MSN per week
Forumstimew	Time of use of Forums per week
YouTubetimew	Time of use of YouTube per week
PornSitestimew	Time of use of pornographic sites per week
ChatTimew	Time of use of chat per week
AdverTimew	Time of use of advertisement pages per week
Googletimew	Time of use of Google per week
Yahootimew	Time of use of Yahoo! per week
Emailtimew	Time of use of E-mail per week
FTPtimew	Time of use of ftp per week
Gamestimew	Time of use of games per week
Blogstimew	Time of use of logs per week
<b>IMPINT</b>	Impact of Internet use on daily activities
DailySchedInf	Degree of influence of daily schedule
PerformStInf	Degree of influence of performance in studies
ParRELInf	Degree of influence of relations with parents
HealthInf	Degree of influence of personal health
TeachInf	Degree of influence of relations with teachers
FellowsfInf	Degree of influence of relations with fellow students and friends
PsychAttidInf	Degree of influence of psychological attitudes
AtttitLifeInf	Degree of influence of attitude towards life
YDTIA	Young's Diagnostic test for Internet Addiction
Absorbedfeel	Do you feel preoccupied with the Internet (think about previous online activity or
1105010041001	anticipate next online session)?
IncreasUseInt	Do you feel the need to use the Internet with increasing amounts of time in order to
	achieve satisfaction?
FailedCheckUse	Have you repeatedly made unsuccessful efforts to control, cut back, or stop Internet use?
DepressLim	Do you feel restless, moody, depressed, or irritable when attempting to cut down or stop Internet use?
OnlineLonger	Do you stay online longer than originally intended?
LossChance	Have you jeopardized or risked the loss of significant relationship, job, educational or
	career opportunity because of the Internet?
LiedInt	Have you lied to family members, therapist, or others to conceal the extent of
A '1D 1.T (	involvement with the Internet?
AvoidProbInt	Do you use the Internet as a way of escaping from problems or of relieving a dysphoric mood (e.g., feelings of helplessness, guilt, anxiety, depression)?
NPB	Negative Psychological Beliefs
Feellonely	Do you feel loneliness and insecurity?
Noinsistence	When you are facing a difficult problem in your life, do you give up on it and don't
Tromsistence	insist on solving it?
Purpenjoym	Do you believe that the main purpose in life is the pursuit of pleasure by any means and nothing else?
NoWork	Do you think of yourself as rather not hardworking?
Targetslife	Do you find yourself not having specific goals in your life e.g. recognition in your working environment, your school, your family, in society?
Triviallife	Do you believe that everything in life is trivial and you are negative toward any sociable ideas?
Abandoned	Do you believe that you are abandoned by your family, friends, teachers and the state?
Disappointment	Are you deeply disappointed of your life?
2 Supposition	J 1 J 11 J

Online Table 2. Problematic Internet Use and demographics.

Variables	Non-problematic Internet Users N At-Risk Internet Users (%) N (%)		Internet Addiction N (%)	Total N (%)
<b>Gender</b> $\chi^2 = 62.6 \text{ df} = 2, p < 0.00$	001	, ,	,	. ,
Female	868 (58.4) <sup>a</sup>	247 (48.2) <sup>a</sup>	93 (34.2) <sup>a</sup>	1208 (53.4) <sup>b</sup>
Male	610 (41.3) <sup>a</sup>	265 (51.8) <sup>a</sup>	179 (65.8) <sup>a</sup>	1054 (46.6) <sup>b</sup>
Parental Family status $\chi^2 = 29$	9.535, df = 4, p< $0.0001$			
Married	49 (3.3) <sup>a</sup>	15 (2.9) <sup>a</sup>	7 (2.6) <sup>a</sup>	71 (3.1) <sup>b</sup>
Not married	1392 (94.5) <sup>a</sup>	480 (94.2) <sup>a</sup>	242 (89.0) a	2114 (93.7) <sup>b</sup>
Divorced	$33 (2.2)^{a}$ revious semester $x^{2} = 37.6$ , df = 6, p<0,0001	15 (2.9) <sup>a</sup>	23 (8.5) <sup>a</sup>	71 (3.1) <sup>b</sup>
Mark of Studies during the pi	revious semester $\chi^2 = 37.6$ , df = 6, p<0.0001			
avemark <sup>c</sup> <5	45 (3.7) <sup>a</sup>	30 (6.8) <sup>a</sup>	24 (10.1) <sup>a</sup>	99 (5.2) <sup>b</sup>
$5 \le avemark^c < 6.5$	510 (41.4) <sup>a</sup>	170 (38.5) <sup>a</sup>	101 (42.6) <sup>a</sup>	787 (41.1) <sup>b</sup>
6.5≤avemark <sup>c</sup> <8	591 (48.0) <sup>a</sup>	201 (45.5) <sup>a</sup>	81 (34.2) <sup>a</sup>	873 (45.6) <sup>b</sup>
8≤avemark <sup>c</sup> <10	85 (6.9) <sup>a</sup>	$41(9.3)^{a}$	31 (13.1) <sup>a</sup>	157 (8.2) b
Living with parents or not $\chi^2$	= 11.55, df $= 2$ , p $= 0.003$			
No	577 (39.4) <sup>a</sup>	197 (38.7) <sup>a</sup>	135 (50.0) <sup>a</sup>	909 (40.5) <sup>b</sup>
Yes	888 (60.6) <sup>a</sup>	312 (61.3) <sup>a</sup>	135 (50.0) <sup>a</sup>	1335 (59.5) <sup>b</sup>
Are you enrolled in STAGE u	inemployment programs? $\chi^2 = 21.3$ , df = 2, p<0.00	001		
No	1183 (93.8) <sup>a</sup>	404 (90.2) <sup>a</sup>	207 (85.5) <sup>a</sup>	1794 (92.0) <sup>b</sup>
Yes	78 (6.2) a	44 (9.8) <sup>a</sup>	35 (14.5) <sup>a</sup>	157 (8.0) <sup>6</sup>
Do you pay the subscription f	For the Internet? $\chi^2 = 8.40$ , df = 2, p=0.015			
No	910 (70.6) <sup>a</sup>	335 (71.0) <sup>a</sup>	149 (61.6) <sup>a</sup>	1394 (69.6) <sup>b</sup>
Yes	379 (29.4) <sup>a</sup>	137 (29.0) <sup>a</sup>	93 (38.4) <sup>a</sup>	609 (30.4) <sup>b</sup>

<sup>&</sup>lt;sup>a</sup> The percentage in each cell is calculated with respect to its column.

<sup>b</sup> The total percentages are calculated with respect to the whole sample.

<sup>c</sup> average mark

Online Table 3. Problematic Internet Use and time use of Internet sites and applications

	PIU			Time of use in h	ours per week		
v artables	PIU	0≤h<1	1≤h<3	3≤h<5	5≤h<7	7≤h<9	<i>h</i> ≥9
MSN	Non Problematic Internet Users N (%)	497 (37.9) <sup>a</sup>	330 (25.2) <sup>a</sup>	187 (14.3) a	110 (8.4) <sup>a</sup>	60 (4.6) <sup>a</sup>	128 (9.8) a
$\chi^2 = 115.97$	At-Risk Internet Users N (%)	107 (22.5) <sup>a</sup>	103 (21.6) a	82 (17.2) <sup>a</sup>	59 (12.4) <sup>a</sup>	29 (6.1) <sup>a</sup>	96 (20.2) <sup>a</sup>
df=10	Internet Addicted N (%)	49 (18.7) <sup>a</sup>	48 (18.3) <sup>a</sup>	47 (17.9) a	33 (12.6) <sup>a</sup>	18 (6.9) <sup>a</sup>	67 (25.6) a
p<0.0001	Total N (%)	653 (31.9) <sup>b</sup>	481 (23.5) b	316 (15.4) <sup>b</sup>	202 (9.9) b	107 (5.2) b	291 (14.2) b
Forums	Non Problematic Internet Users N (%)	766 (65.4) a	217 (18.5) a	107 (9.1) a	40 (3.4) a	18 (1.5) <sup>a</sup>	24 (2.0) a
$\chi^2 = 93.45$	At-Risk Internet Users N (%)	223 (50.5) <sup>a</sup>	94 (21.3) a	63 (14.3) a	30 (6.8) a	$10(2.3)^a$	22 (5.0) a
df=10	Internet Addicted N (%)	95 (39.3) a	64 (26.4) a	32 (13.2) a	20 (8.3) a	$12(5.0)^a$	19 (7.9) a
p<0.0001	Total N (%)	1084 (58.4) <sup>b</sup>	375 (20.2) b	202 (10.9) b	90 (4.8) b	40 (2.2) b	65 (3.5) b
YouTube	Non Problematic Internet Users N (%)	480 (37.0) a	394 (30.3) a	215 (16.6) <sup>a</sup>	112 (8.6) a	52 (4.0) a	46 (3.5) a
$\chi^2 = 138.79$	At-Risk Internet Users N (%)	116 (24.3) a	149 (31.2) <sup>a</sup>	84 (17.6) <sup>a</sup>	51 (10.7) a	35 (7.3) <sup>a</sup>	43 (9.0) a
df=10	Internet Addicted N (%)	35 (13.3) a	62 (23.6) a	60 (22.8) a	46 (17.5) a	20 (7.6) <sup>a</sup>	40 (15.2) a
p<0.0001	Total N (%)	631 (30.9) <sup>b</sup>	605 (29.7) b	359 (17.6) <sup>b</sup>	209 (10.2) <sup>b</sup>	107 (5.2) <sup>b</sup>	129 (6.3) <sup>b</sup>
Pornographic sites	Non Problematic Internet Users N (%)	948 (83.8) a	107 (9.5) <sup>a</sup>	21 (1.9) <sup>a</sup>	7 (0.6) <sup>a</sup>	11 (1.0) <sup>a</sup>	37 (3.3) a
$\chi^2 = 219.4$	At-Risk Internet Users N (%)	296 (67.0) a	63 (14.3) a	29 (6.6) <sup>a</sup>	21 (4.8) <sup>a</sup>	8 (1.8) <sup>a</sup>	25 (5.7) a
df=10	Internet Addicted N (%)	117 (47.4) a	36 (14.6) a	25 (10.1) <sup>a</sup>	13 (5.3) a	15 (6.1) <sup>a</sup>	41 (16.6) a
p<0.0001	Total N (%)	1361 (74.8) <sup>b</sup>	206 (11.3) b	75 (4.1) <sup>b</sup>	41 (2.3) b	34 (1.9) b	103 (5.7) <sup>b</sup>
Chat	Non Problematic Internet Users N (%)	778 (67.6) a	220 (19.1) a	76 (6.6) <sup>a</sup>	42 (3.6) a	12 (1.0) <sup>a</sup>	23 (2.0) a
$\chi^2 = 190.08$	At-Risk Internet Users N (%)	230 (52.0) <sup>a</sup>	92 (20.8) a	48 (10.9) a	30 (6.8) a	22 (5.0) <sup>a</sup>	20 (4.5) a
df=10	Internet Addicted N (%)	87 (34.5) <sup>a</sup>	48 (19.0) a	39 (15.5) <sup>a</sup>	24 (9.5) <sup>a</sup>	19 (7.5) <sup>a</sup>	35 (13.9) <sup>a</sup>
p<0.0001	Total N (%)	1095 (59.3) <sup>b</sup>	360 (19.5) <sup>b</sup>	163 (8.8) b	96 (5.2) b	53 (2.9) b	78 (4.2) b
Advertisement	Non Problematic Internet Users N (%)	891 (75.8) <sup>a</sup>	190 (16.2) a	54 (4.6) a	28 (2.4) a	7 (0.6) a	6 (0.5) a
$\chi^2 = 85.35$	At-Risk Internet Users N (%)	297 (67.0) a	81 (18.3) <sup>a</sup>	28 (6.3) a	19 (4.3) a	8 (1.8) <sup>a</sup>	10 (2.3) a
df=10	Internet Addicted N (%)	140 (56.7) a	43 (17.4) a	23 (9.3) <sup>a</sup>	20 (8.1) <sup>a</sup>	8 (3.2) <sup>a</sup>	13 (5.3) <sup>a</sup>
p<0.0001	Total N (%)	1328 (71.2) <sup>b</sup>	314 (16.8) <sup>b</sup>	105 (55.6) <sup>b</sup>	67 (3.6) <sup>b</sup>	23 (1.2) <sup>b</sup>	29 (1.6) <sup>b</sup>
Google	Non Problematic Internet Users N (%)	298 (21.8) a	449 (32.9) a	279 (20.4) a	159 (11.6) <sup>a</sup>	87 (6.4) <sup>a</sup>	94 (6.9) <sup>a</sup>
$\chi^2 = 46,28$	At-Risk Internet Users N (%)	74 (15.6) a	135 (28.4) a	113 (23.8) a	65 (13.7) a	34 (7.2) a	54 (11.4) a
df=10	Internet Addicted N (%)	36 (13.9) a	64 (24.7) <sup>a</sup>	62 (23.9) <sup>a</sup>	34 (13.1) <sup>a</sup>	22 (8.5) <sup>a</sup>	41 (15.8) <sup>a</sup>
p<0.0001	Total N (%)	408 (19.4) <sup>b</sup>	648 (30.9) <sup>b</sup>	454 (21.6) <sup>b</sup>	258 (12.3) <sup>b</sup>	143 (6.8) <sup>b</sup>	189 (9.0) <sup>b</sup>
Yahoo!	Non Problematic Internet Users N (%)	582 (45.7) a	350 (27.7) a	167 (13.1) a	81 (6.4) <sup>a</sup>	51 (4.0) a	40 (3.1) a
$\chi^2 = 39.66$	At-Risk Internet Users N (%)	193 (41.9) a	112 (24.3) a	77 (16.7) <sup>a</sup>	39 (8.5) <sup>a</sup>	24 (5.2) a	16 (3.5) <sup>a</sup>
df=10	Internet Addicted N (%)	93 (37.1) a	51 (20.3) a	45 (17.9) <sup>a</sup>	20 (8.0) <sup>a</sup>	22 (8.8) <sup>a</sup>	20 (8.0) <sup>a</sup>
p<0.0001	Total N (%)	868 (43.7) <sup>b</sup>	516 (26.0) <sup>b</sup>	289 (14.6) <sup>b</sup>	140 (7.0) <sup>b</sup>	97 (4.9) <sup>b</sup>	76 (3.8) <sup>b</sup>
E-mail	Non Problematic Internet Users N (%)	401 (30.7) a	417 (32.0) a	215 (16.5) a	128 (9.8) <sup>a</sup>	66 (5.1) <sup>a</sup>	78 (6.0) <sup>a</sup>

Variables	PIU		Time of use in hours per week							
variables		0≤h<1	1≤h<3	3≤h<5	5≤h<7	7≤h<9	<i>h</i> ≥9			
$\chi^2 = 80.82$	At-Risk Internet Users N (%)	94 (19.7) <sup>a</sup>	138 (28.9) a	101 (21.2) <sup>a</sup>	52 (10.9) a	43 (9.0) <sup>a</sup>	49 (10.3) a			
df=10	Internet Addicted N (%)	54 (20.8) a	53 (20.5) <sup>a</sup>	51 (19.7) <sup>a</sup>	38 (14.7) a	20 (7.7) <sup>a</sup>	43 (16.6) <sup>a</sup>			
p<0.0001	Total N (%)	549 (26.9) b	608 (29.8) b	367 (18.0) b	218 (10.7) b	129 (6.3) b	170 (8.3) b			
ftp	Non Problematic Internet Users N (%)	906 (82.1) <sup>a</sup>	122 (11.1) a	40 (3.6) <sup>a</sup>	20 (1.8) <sup>a</sup>	7 (0.6) a	8 (0.7) a			
$\chi^2 = 109.38$	At-Risk Internet Users N (%)	304 (71.9) <sup>a</sup>	53 (12.5) a	25 (5.9) <sup>a</sup>	23 (5.4) <sup>a</sup>	4 (0.9) a	14 (3.3) a			
df=10	Internet Addicted N (%)	140 (58.3) <sup>a</sup>	33 (13.8) <sup>a</sup>	33 (13.8) a	14 (5.8) a	7 (2.9) a	13 (5.4) <sup>a</sup>			
p<0.0001	Total N (%)	1350 (76.4) <sup>b</sup>	208 (11.8) <sup>b</sup>	98 (5.5) <sup>b</sup>	57 (3.2) <sup>b</sup>	18 (1.0) <sup>b</sup>	35 (2.0) <sup>b</sup>			
Games	Non Problematic Internet Users N (%)	676 (56.8) <sup>a</sup>	273 (22.9) a	119 (10.0) a	60 (5.0) a	19 (1.6) a	44 (3.7) a			
$\chi^2 = 160.46$	At-Risk Internet Users N (%)	169 (37.8) a	117 (26.2) a	63 (14.1) a	39 (8.7) a	30 (6.7) a	29 (6.5) a			
df=10	Internet Addicted N (%)	76 (30.2) <sup>a</sup>	53 (21.0) <sup>a</sup>	37 (14.7) a	22 (8.7) a	26 (0.3) <sup>a</sup>	38 (15.1) <sup>a</sup>			
p<0.0001	Total N (%)	921 (48.7) <sup>b</sup>	443 (23.4) <sup>b</sup>	219 (11.6) <sup>b</sup>	121 (6.4) <sup>b</sup>	75 (4.0) <sup>b</sup>	111 (5.9) <sup>b</sup>			
Blogs	Non Problematic Internet Users N (%)	802 (70.3) a	186 (16.3) a	86 (7.5) <sup>a</sup>	36 (3.2) a	14 (1.2) <sup>a</sup>	17 (1.5) <sup>a</sup>			
$\chi^2 = 131.64$	At-Risk Internet Users N (%)	247 (57.4) <sup>a</sup>	9 (21.4) a	42 (9.8) a	17 (4.0) a	18 (4.2) a	14 (3.3) a			
df=10	Internet Addicted N (%)	94 (38.2) <sup>a</sup>	55 (22.4) <sup>a</sup>	43 (17.5) <sup>a</sup>	18 (7.3) <sup>a</sup>	$16(6.5)^{a}$	20 (8.1) <sup>a</sup>			
p<0.0001	Total N (%)	1143 (62.9) <sup>b</sup>	333 (18.3) <sup>b</sup>	171 (9.4) <sup>b</sup>	71 (3.9) <sup>b</sup>	48 (2.6) <sup>b</sup>	51 (2.8) <sup>b</sup>			

<sup>&</sup>lt;sup>a</sup> The percentage in each cell is calculated with respect to its row.

<sup>b</sup> The total percentages are calculated with respect to the whole sample.

Online Table 4. PIU and association with other personal habits or dependencies.

Variables	PIU		Quantity consumed per day							
, undotes	110	0 to 1	2 to 3	3 to 4	4 to 5	6 to 7	more than 7			
Alcoholic Drinks	Non Problematic Internet Users N (%)	1088 (75.9) <sup>a</sup>	211 (14.7) <sup>a</sup>	61 (4.3) <sup>a</sup>	34 (2.4) <sup>a</sup>	16 (1.1) <sup>a</sup>	24 (1.7) <sup>a</sup>			
$\chi^2 = 151.30$	At-Risk Internet Users N (%)	319 (64.3)	94 (19.0) a	31 (6.2) <sup>a</sup>	22 (4.4) <sup>a</sup>	13 (2.6)	17 (3.4) a			
df=10	Internet Addicted N (%)	128 (49.0) <sup>a</sup>	40 (12.3) <sup>a</sup>	32 (12.3) <sup>a</sup>	19 (7.3) <sup>a</sup>	15 (5.7) <sup>a</sup>	27 (10.3) a			
p<0.0001	Total N (%)	1535 (70.1) b	345 (15.7) b	124 (5.7) b	75 (3.4) <sup>b</sup>	44 (2.0) b	68 (3.1) b			
Drinking Coffees	Non Problematic Internet Users N (%)	777 (53.9) <sup>a</sup>	485 (33.7) <sup>a</sup>	122 (8.5) <sup>a</sup>	28 (1.9) <sup>a</sup>	15 (1.0) <sup>a</sup>	14 (1.0) <sup>a</sup>			
$\chi^2 = 179.15$	At-Risk Internet Users N (%)	220 (44.2) <sup>a</sup>	162 (32.5) <sup>a</sup>	66 (13.3) <sup>a</sup>	25 (5.0) a	12 (2.4) a	13 (2.6) <sup>a</sup>			
df=10	Internet Addicted N (%)	$72(27.7)^{a}$	86 (33.1) a	37 (14.2) a	26 (10.0) a	19 (7.3) a	20 (7.7) a			
p<0.0001	Total N (%)	1069 (48.6) b	733 (33.3) b	225 (10.2) b	79 (3.6) b	46 (2.1) b	47 (2.1) b			
Smoking Cigarettes	Non Problematic Internet Users N (%)	812 (57.7) <sup>a</sup>	157 (11.2) <sup>a</sup>	186 (13.2) a	138 (9.8) <sup>a</sup>	69 (4.9) <sup>a</sup>	45 (3.2) <sup>a</sup>			
$\chi^2 = 141.84$	At-Risk Internet Users N (%)	228 (46.2) <sup>a</sup>	52 (10.5) <sup>a</sup>	74 (15.0) <sup>a</sup>	70 (14.2) <sup>a</sup>	46 (9.3) <sup>a</sup>	23 (4.7) <sup>a</sup>			
df=10	Internet Addicted N (%)	82 (31.4) a	32 (12.3) a	30 (11.5) a	55 (21.1) a	21 (8.0) <sup>a</sup>	41 (15.7) a			
p<0.0001	Total N (%)	1122 (51.9) b	241 (11.2) <sup>b</sup>	290 (13.4) <sup>b</sup>	263 (12.2) <sup>b</sup>	136 (6.3) b	109 (5.0) b			

		Frequency of taking drugs per day						
		none	once	twice	three times	More than three times		
Taking drugs	Non Problematic Internet Users N (%)	1350 (95.1) <sup>a</sup>	34 (2.4) <sup>a</sup>	9 (0.6) <sup>a</sup>	5 (0.4) <sup>a</sup>	22 (1.5) <sup>a</sup>		
$\chi^2 = 174.42$	At-Risk Internet Users N (%)	426 (86.2) <sup>a</sup>	23 (4.7) <sup>a</sup>	6 (1.2) <sup>a</sup>	15 (3.0) <sup>a</sup>	24 (4.9) <sup>a</sup>		
df=10	Internet Addicted N (%)	188 (71.8) <sup>a</sup>	26 (9.9) a	13 (5.0) <sup>a</sup>	4 (1.5) a	31 (11.8) <sup>a</sup>		
p<0.0001	Total N (%)	1964 (90.3) <sup>b</sup>	83 (3.8) b	28 (1.3) b	24 (1.1) <sup>b</sup>	77 (33.5) <sup>b</sup>		

<sup>&</sup>lt;sup>a</sup> The percentage in each cell is calculated with respect to its row.

<sup>b</sup> The total percentages are calculated with respect to the whole sample.