



# Dysfunctional Internet Use by Adolescents in an Urban Environment: A Case-Control Study

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## ABSTRACT

**Background:** Dysfunctional internet use (DIU), or Internet Addiction Disorder, refers to excessive engagement with internet use which results in significant impairment of the individual's ability to function in various fields of life, for an extended period of time. This multifactorial phenomenon concerns every society throughout the contemporary world. The present study examines personal, familial and social factors associated with DIU in adolescents who grew up in an urban environment during a period of severe economic crisis.

**Materials and methods:** DIU cases were matched 1:1 by age and gender to controls in a retrospective case-control study. The clinical sample consisted of adolescents who had been referred to the Adolescent Health Unit of the 2nd Department of Pediatrics, National and Kapodistrian University of Athens, and diagnosed as "Internet Addicted". Adolescents in the control group had been referred to the same Department for reasons other than DIU. Analysis was by conditional logistic regression with the presence of DIU as dependent variable.

**Results:** In multivariate analysis, family status (the adolescent not living with both parents) was a statistically significant risk factor for DIU (odds ratio 5.03, 95% confidence interval 1.20 – 21.0). Protective factors were participation in physical activity (odds ratio 0.05, 0.01 – 0.19) and antisocial behavior (odds ratio 0.10, 0.04 – 0.25).

**Conclusions:** Our findings indicate factors strongly associated with adolescent DIU in an urban setting during the economic crisis and complement other studies which have largely been based on self-report school surveys.

**Key words:** *Dysfunctional Internet Use; adolescents; risk factors; economic crisis.*

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## Introduction

Excessive use and dysfunctional (or compulsive or problematic) use of the internet is a new and growing social issue that is of great concern to the international scientific community. The characteristics and dimensions of this problem are continuously changing, in parallel with the increasingly widespread use of computers and other devices for accessing the internet [1]. The worldwide web offers convenient facilities for many human activities; thus the way that people communicate with each other, work, obtain entertainment, and manage their daily lives has changed dramatically. A vulnerable person may use the internet for prolonged periods of time, possibly resulting in social isolation and distance from others [2]. Dysfunctional internet users tend to be devoted to the internet and indifferent to more significant parts of life [3].

Adolescence, which we take to be the period from 11 to 18 years old, is very important since at this stage of life individuals try to find their own identity, to achieve acceptance from their environment and to act independently. This period is often accompanied by personal crisis and conflicts with adults, which may lead the adolescent to develop several defensive mechanisms. These conditions may facilitate the adoption of various behaviours as a form of psychological release, including excessive use of the internet [4]. Today's adolescents belong to one of the first generations that has grown up in a world where computers are widely available and make this outlet available.

The constant evolution of electronic devices creates a new environment and the continuous connectivity that seemed impossible a few years ago is now a fact. New terms are emerging to describe the effects of these new possibilities, especially on the behaviour of young people such as the Fear of Missing Out (FOMO) [5]. While dysfunctional internet use (DIU) is an evolving phenomenon, and therefore difficult to identify, it has, like all addictive behaviours, features that have been widely studied. The development of such behaviours in adolescence is a multifactorial phenomenon: the risk factors that have been identified include family history, individual personality and psychopathology [6,7]. There is currently clear evidence linking addictive behaviours with the environment and the

quality of interactions within it. Therefore, adolescents' dysfunctional behaviours are a symptom of the functioning of a living system [8,9].

There are so far only limited data in Greece concerning risk factors that may predispose adolescents towards developing DIU. Therefore, the aim of the present study was to identify possible risk factors of DIU among Greek adolescents during the financial crisis of recent years. The consequences of this crisis were most noticeable in Athens [10] and affected directly the lives of the adults who were responsible for the care of adolescents, possibly impinging upon their ability to exercise this parental role. In this way, the financial crisis significantly influenced the environment in which these teenagers have grown up, at societal and family level. The data of the present study were collected in a healthcare environment and take the form of a case-control study. This is in contrast to most previous studies in Greece which were based on self-report questionnaires administered to adolescents in cross-sectional school-based surveys (see, for example, [11]).

## Methods

### *Study design and participants*

A retrospective case-control study design was employed to examine the research questions of this study concerning characteristics of the environment and adolescents' relationship with it. The data from the case group were retrieved from the records of adolescents who attended the Adolescent Health Unit of the 2nd Department of Pediatrics of the University of Athens Medical School in order to receive therapy for their problematic use of the internet. The control group consisted of adolescents with characteristics similar to the case group who had been referred to the same Department for reasons which were not linked to DIU. Cases and controls were matched one-to-one by age and gender. The final sample consisted of 198 cases and 198 controls.

### *Dysfunctional internet use*

The diagnosis of DIU was based on the Internet Addiction Test (IAT) [12,13]. This widely-used instrument consists of 20 questions concerning behavi-

-or related to use of the internet, such as “How often do you find that you stay online longer than you intended?” and “How often do you choose to spend more time online over going out with others?”. Each item is answered on a five-point scale from “Rarely” to “Always”, with the response “Does not apply” also available. The IAT score ranges from 0 to 100, with higher scores indicating a more severe level of internet addiction. The classification of internet addiction is as follows: participants with a score from 0 to 30 points are classified as normal internet users; with a score between 31 and 49 as having mild level of addiction; with a score between 50 and 79 as having moderate level; and with a score from 80 to 100 as having severe internet addiction [12]. Adolescents falling in the last of these categories comprised the cases in our study.

### ***Demographic, psychological, and social factors***

The participants in this study had also completed the HEADSSS Adolescent Psychosocial Assessment [14], part of the Achenbach Questionnaire [15] and part of the Family Crisis Oriented Personal Scales Questionnaire (F-COPES) [16]. These instruments were employed to evaluate demographic, social, and psychological parameters as well as to adjust for possible confounders.

### ***Statistical analysis***

Continuous variables are represented as means ( $\pm$  SD) and categorical variables as number and percentage of participants. The normality of continuous variables was assessed using the Kolmogorov-Smirnov test, as well as qualitatively using histograms. The association between each factor and the outcome variable was tested using both univariate and multivariable models. The univariate models included simple conditional logistic regression, where DIU was the dependent variable, and McNemar’s test. The multivariable model was multiple conditional logistic regression with DIU as the dependent variable and the independent variables those that had been found to have significant correlation with DIU in the univariate model. Statistical analysis was performed with IBM SPSS for Windows, Version 25.0. Armonk, NY: IBM Corp. and the level of statistical significance was set at 0.05.

### **Results**

The final sample consisted of 338 males (85.4%) and 58 females (14.6%). The distribution of demographic,

social and psychological characteristics in cases and controls is shown in Table 1. Almost all the factors that were considered showed substantial differences between the two groups of adolescents. Regarding the sociodemographic characteristics, the cases significantly more often than the controls were not living with both parents, had no siblings, had no friends, and had a poor school mark ( $p < 0.001$ ). There were also statistically significant relationships between parents’ occupations and group ( $p < 0.001$ ). In particular, both the fathers (13%) and mothers (12%) of cases were more likely to belong to professional occupations than the parents of controls (3% and 4%, respectively), but also were more likely to be unemployed (9% of cases vs. 2% of controls, for both parents). Correspondingly fewer mothers and fathers of cases than controls were private-sector employees.

Over 90% of the adolescents in the control group took part in physical activity, virtually double the corresponding figure (49%) among the cases ( $p < 0.001$ ). On the other hand, antisocial behavior was recorded for a much lower percentage of cases than controls (21% vs. 71%,  $p < 0.001$ ).

Regarding psychological characteristics, differences between the two groups were smaller than for the social and demographic variables, although still statistically significant (Table 1), Anger, anxiety and sadness were all noted more often in cases than in controls. On the other hand, phobias were recorded more often in controls (25%) than in cases, amongst whom they were relatively rare (9%).

The results from the multiple conditional logistic regression (Table 2) showed that parents’ marital status, participation in physical activities and antisocial behaviour were independent significant predictors of DIU. Not living with both parents greatly increased the risk of DIU. Participation in physical activities and antisocial behaviour both strongly reduced the risk of DIU. This analysis did not include parental occupations and school mark, because of missing data.

### **Discussion**

Dysfunctional or addictive use of the internet is of increasing interest to the scientific community and has been the subject of many international studies in recent years. It is indicative that the number of articles published

Table 1. Demographic, social and psychological characteristics compared between cases and controls. Each percentage is calculated based on the number of adolescents for whom the relevant information was recorded.

Characteristic	Frequency (%) in cases (n=198)	Frequency (%) in controls (n=198)	p
Father's occupation			<0.001
<i>Private sector employee</i>	29.1	41.1	
<i>Public sector employee</i>	13.9	19.5	
<i>Self-employed</i>	25.8	23.4	
<i>Professional</i>	13.2	3.2	
<i>Other*</i>	8.6	7.0	
<i>Unemployed</i>	9.3	2.1	
Mother's occupation			<0.001
<i>Private sector employee</i>	23.7	34.2	
<i>Public sector employee</i>	25.7	23.0	
<i>Self-employed</i>	8.6	8.0	
<i>Professional</i>	11.8	4.3	
<i>Other*</i>	21.1	28.3	
<i>Unemployed</i>	9.2	2.1	
Living with both parents (yes vs. no)	72.9	89.6	<0.001
Has siblings (yes vs. no)	69.7	83.8	<0.001
School mark $\geq 15/20$ (vs. <15)	58.5	92.5	<0.001
Has friends (yes vs. no)	76.2	96.1	<0.001
Physical activity (yes vs. no)	49.2	95.0	<0.001
Antisocial behaviour (yes vs. no)	20.8	71.3	<0.001
Anger (yes vs. no)	51.6	38.3	0.11
Anxiety (yes vs. no)	56.3	48.5	0.005
Sadness (yes vs. no)	34.0	21.1	<0.001
Phobias (yes vs. no)	8.8	25.3	<0.001

\* Retired or not economically active

Table 2. Multiple conditional logistic regression with the presence of dysfunctional internet behaviour as dependent variable.

Variable	Adjusted odds ratio	95% CI*	p value
Not living with both parents	5.03	1.20 – 21.0	0.027
Physical activities	0.05	0.01 – 0.19	<0.001
Antisocial behaviour	0.10	0.04 – 0.25	<0.001

\*Confidence interval

in PubMed with reference to Internet Addiction increased from 32 in 2005 to 296 in 2015 and 396 in the following year.

DIU is a multifactorial phenomenon. The present case-control study aimed to contribute to the identification of factors related to DIU among adolescents who grew up in an urban environment during the recent economic crisis in Greece. This timing is one factor that differentiates it from other studies, since the economic crisis formed a new context affecting Greek society at all levels, but particularly at the family level which plays a decisive role in the manifestation of dysfunctional behaviours by adolescents.

The results of our study indicate that parents' marital status was strongly associated with DIU. The role of the parental system in the manifestation of dysfunctional behaviours in adolescence has been confirmed by a large number of studies. Ozer and colleagues [17] demonstrated the correlation of the demarcated family framework with better school performance and reduced vulnerability to high-risk behaviors. The presence of only a single parent at home may significantly affect the ability to set limits, thus forming a more flexible environment which presents less of an obstacle to the emergence of dysfunctional behaviours.

Our results showed that participation in physical activities acts as a protective factor. Stavropoulos and colleagues, referring to the characteristics of dependent adolescents, described enjoyment and responsibility as "protective counterweights" in the development of DIU [18]. An interesting finding is that the adoption of antisocial behaviour is another protective factor, in the sense that it is associated with a reduced probability of DIU. Young [12] pointed out that addicts are characterized by introversion. Antisocial behaviour, like externalizing internal tensions, relaxes and relieves. The hypothesis that DIU would be associated with the parental occupations most affected by the financial crisis, self-employed and private sector employees - who were more common among the parents of the case group - could not be tested in the multivariable analysis. In univariate analysis, one finding that concerned us was the increased percentages (although relatively low) of unemployed parents and parents engaged in the professions in the case group. Uncertainty caused by unemployment among adults who have experienced it has been shown to affect the psycho-emotional development of children, while an increase in mental and

social problems has been recorded in children due to the economic crisis [19].

At the same time, high financial and educational level of parents have been linked with the development of DIU by adolescent children [20,21]. Tsitsika and Tzavela [22] discuss the phenomenon of "hyperparenting" observed in the middle and upper economic strata. The parents do not leave initiatives to the teenager and take responsibility for his or her own choices, projecting their own desires. Teenagers react by choosing the internet as a way out and a means of opposing their parents' attempt to control their lives. Our thinking, which would be a suggestion for further research, is that the high level of education may be associated with uncertainty or embarrassment in the exercise of parental role, an indication of a shift from traditional methods of practising this role.

In our research, the school performance of the controls was significantly higher than that of the case group. The excessive use of the internet has been linked to problems in academic performance [23]. Orientation to school seems to reflect a more general level of adolescent functionality.

The present study is not free of limitations. In particular the way that the information was collected limited its effectiveness since it was not designed for the purposes of this study. Some variables of interest had missing values and certain other interesting data, such as smoking, were not recorded. Furthermore, the control group does not constitute a representative sample of the general adolescent population of Athens. Nonetheless, the present study adds valuable information to the existing literature on dysfunctional use of the internet in Greece, which previously had largely been obtained from self-reports collected in school-based studies.



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