

The Relationship of Increased Internet Use to Mental Health in Adults. A Quantitative Study in Greece

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Abstract:

Background: In recent years the internet and social networks have become an integral part of many people's daily lives and seem to have a great impact on their lifestyle. Using the internet is a psychoactive experience for users, which can lead to abuse or even addiction. There is a need to investigate increased internet use in a large study sample, as well as its relationship to mental health.

Aim: The aim of this research is to investigate the relationship between increased internet use and mental health.

Method: The sampling technique is simple random sampling. The research sample consists of 105 adults, men and women. The data was collected using the Internet Addiction Test (IAT) questionnaires as well as the Depression Anxiety Stress Scale (DASS-21) with the addition of demographic data.

Results: The findings showed that educational level and marital status were significantly related to the depression scale. It also appeared that the more internet addiction symptoms the participants had, the more depression, anxiety and stress symptoms they had.

Conclusion: From the research it appears that the increased use of the internet can lead to addiction and subsequently to poor mental health

Key words: mental health; addiction; digital technologies; internet; computer

Introduction:

In recent years, the internet and social networks have become an integral part of people's daily lives, especially young people. It is a fact that the internet and new digital technologies provide new ways to create relationships, friendships and collaborations, are leisure activities, offer opportunities for interaction and information exchange, collaborative work and communication [1]. However, new technologies and the internet seem capable of abuse or even addiction. The internet is a psychoactive experience for users. Some of the advantages are easy access, ease of use, low cost, anonymity and stimulating content. As a psychoactive, it has the characteristic that it can change the mood, but also the behavior of the users. By extension, the internet can affect emotions and everyday life [2]. It is observed that many behaviors that are not necessarily related to substances, whether they are chemical or not, can become addictive for a large part of the population.

There is no agreed upon way to ensure the validity of a diagnosis of internet addiction. The international scientific community most often uses "maladaptive internet use" as evidenced by at least one of the following: engaging in online activities that a person finds too tempting or using the

internet for longer periods of time than originally planned. There are various terms used to describe excessive internet use, including dependence, addiction, compulsion, and abuse [3]. Although the criteria for internet addiction relate to the amount of time spent on it, as well as the symptoms a person experiences after stopping use, it can also be related to another DSM-IV Axis I disorders. Internet addiction does not occur only when a person is manic or hypomanic and is not caused by other mental disorders listed in DSM-IV Axis I [4].

In general, the symptoms of Internet addiction are related to both the time a person spends on it and how the user feels after stopping using it. In the second case, the person's feelings and behavior may change rapidly, they may be irritable or anxious, and negative feelings or problems they may have had before using the internet, such as depression or anxiety, may worsen. The individual may develop a conflictual relationship with his family, which often happens in the teenage population, start lying about his time on the internet, withdraw from people he was close to an end up losing relationships and opportunities for education or career development. He may also perform poorly at work or school [5]. A person is considered to have Internet addiction if they experience three or more of the following symptoms for at least one year continuously: development of tolerance, withdrawal symptoms, use for increasing periods of time, multiple but unsuccessful attempts to reduce use, abandonment of important social, recreational or professional activities due to the use and continued use of the internet despite the fact that it causes permanent damage to his mental health [5].

The way someone uses the internet can be dangerous for themselves and the people they know. In this case the person seems to use the internet in a certain way, for a long time and with increased frequency. The actions and thinking of the addicted person are characterized by the behavior mentioned above, with the result that even when the person is not connected, they think strongly about when they will be able to connect again [5].

It seems that this research has the potential to contribute significantly to the existing literature, as the increased use of the Internet and its effect on the mental health of adults has not been thoroughly investigated in the Greek population. Therefore, it is very important to carry out this research, as it is necessary for further study on increased internet use. The purpose of this research is to determine the relationship of mental health with increased internet use by adults. The research hypotheses are as follows: Is Internet use related to users' mental health? Does the increased use of the internet harm the mental health of users?

Method:

Research design:

The type of study carried out is cross-sectional. The independent variable is the degree of internet use and the dependent variable is mental health. The researcher studied in depth the researches that have already been carried out in the field of his interest, doing a literature review. Then, he created and formulated the hypotheses that were tested along the way and then designed the research, using questionnaires. He then conducted the survey and proceeded

to a statistical analysis of the results, examining alternative explanations for the findings. Based on the findings he was able to answer the research questions and report whether the hypothesis was supported or not. Finally, he considered whether the findings can be generalized and proceeded to write up the study conducted.

Sample:

The criteria for participation in the study are that the respondents are between the ages of 18 and 65, use the Internet, speak and understand the Greek language sufficiently, have the ability to communicate with the researcher, and consent to their voluntary participation in the research. The criteria for exclusion from the study are the non-consent of the respondent and the decision of the respondent to withdraw from the research. The technique followed is simple random sampling. The sample consists of people from the general population, men and women, who decided to participate in the research voluntarily. Participants were approached via electronic media. Specifically, the approach was made by sending the link of the electronic questionnaire to emails and social networks of people from the researcher's social environment.

Questionnaires:

The questionnaires were administered by electronic means. The questionnaires are accompanied by the information and consent form. First, Young's Internet Addiction Test (IAT-20) was given. The purpose of the test is to investigate the degree to which the internet affects a person's daily life, his social life, his productivity, his sleeping hours as well as his emotions. The Internet Addiction Test consists of 20 questions which measure the extent to which the person uses the internet. Questions are answered via a five-point Likert scale from 1 (never) to 5 (always). The test includes a total of 6 subscales, strong desire to use, excessive use, neglect of work, impatience, lack of control, neglect of social life. The Test outputs a total score that ranges from 20 to 100 as well as a score for each subscale. The higher the total score of the test, the more Internet use is considered. The score ranges for the degree of internet use are: 20-39 points correspond to normal use, 40-59 points correspond to moderate internet use and 60-100 to excessive internet use. The Internet Addiction Test was adapted and translated into Greek according to the reverse translation process. When checking the internal consistency, an excellent reliability value was obtained with the Cronbach index equal to 0.87 and the test-retest reliability index equal to 0.72. Then, the Depression Anxiety Stress Scale (DASS-21) was developed by P.F. Lovibond and the S.H. Lovibond in 1993 [6]. The Depression, Anxiety and Stress Scale is a set of three self-report scales designed to measure negative emotional states such as depression, anxiety and stress. Participants are asked to respond by thinking about how much each of the 21 statements represents them through a 4-point Likert-type scale ranging from 0 (Did not apply to me at all) to 3 (Applied to me very much, or most of the time). There is no time limit for completing the questionnaire. Each of the three DASS scales includes 7 questions, which are divided into subscales. The Depression scale assesses distress, hopelessness, devaluation of life, and apathy. The Anxiety Scale assesses autonomic nervous system arousal, state anxiety, and the subjective experience of the impact of anxiety. The stress scale is sensitive to elevated levels of

chronic nonspecific arousal, assessing difficulty relaxing, hyperarousal, irritability, irritability, and impatience. Each subscale outputs a total score as the sum of the scores for each statement and ranges from 0 to 21. The total score is calculated as the sum of the total score of the subscales and then divided by 3 in order to calculate the total value of negative emotional state. The interpretation of the results is as follows, if the score is less than 0.5 it is considered a normal condition, from 0.5-1 it is mild, from 1-2 it is moderate, from 2-3 it is severe and if the score is greater than 3 considered extremely serious. In case of high values, the person should get medical advice. The Depression, Anxiety and Stress Scale has been adapted to the Greek language by Lyrakos N. G., Arvaniti C., Smyrnioti M., Kostopanagiotou G. [7] and translated into it based on the process of independent reverse translation. The internal consistency reliability for all the propositions of the scale is Cronbach's $\alpha=0.965$. The questionnaire also has good content validity as well as good construct validity.

Procedure:

This research has received the approval of the Ethics and Research Committee of the SCG - Scientific College of Greece, with protocol number: TER2023118. The process was carried out remotely with electronic administration of the questionnaires and more specifically through Microsoft Forms. Participants received an informed consent form, which details the purpose of the research, informs about the confidentiality and privacy of the participants' information, and informs them of their rights, such as withdrawing their participation at any time. The researcher, after obtaining permission from the authors of the questionnaires, followed the following steps. First, assess whether the research is ethically acceptable. The participants were assured that they would not face any danger. The researcher maintained throughout the research the responsibility, so that the rules of ethics were observed. Still, the researcher gave and respected the freedom of each participant to withdraw, but also to completely refuse his participation in the research at any time he decided. It is the researcher's responsibility to protect the participants from any physical and mental risks that may arise during the research process. After completing the data collection from the participants, the researcher informed them in detail about the research and its purpose. All data collected from participants during the survey is considered confidential. The participants did not have to record their name, nor put their signature, as unique identification codes were used. After consenting to participate in the survey, the respondent was asked to enter a four-digit number of their choice. For the possibility that some of the participants may not have realized that they have an increased dependence on the Internet and felt psychological discomfort answering the questions of the psychometric tools, measures were taken to limit this risk. At the end of the research process, the researcher provided an information form to the participants, which states that in case they felt discomfort or discomfort from the questions, they can turn to specific agencies and mental health specialists, as well as their contact information.

Statistical analysis:

Using the Kolmogorov-Smirnov test, the distributions of the

quantitative variables were tested for normality. For those that were normally distributed, mean values and standard deviations (Standard Deviation=SD) were used for their description, while for those that were not normally distributed, medians and interquartile ranges were additionally used. Absolute (N) and relative (%) frequencies were used to describe qualitative variables. Spearman's correlation coefficient (ρ) was used to test the relationship between two quantitative variables. Linear regression analysis was used to find independent factors associated with the DASS-21 scale from which dependence coefficients (β) and their standard errors (standard errors=SE) were derived. Linear regression analysis was performed using logarithmic transformations on those dimensions that did not follow a normal distribution. Significance levels are two-sided and statistical significance was set at 0.05. The statistical program SPSS 26.0 was used for the analysis.

Results:

The sample consisted of 105 people, of which 73.3% were women. The mean age of the participants was 36.4 years (SD=9.4 years). Also, 35.2% of the participants had a master's degree and 29.5% were university graduates. More than half of the participants were single (52.4%). While everyone used the internet, 82.9% used it for work and 96.2% had a profile on a social networking site.

Regarding the descriptive measures of the dimensions of the IAT scale, the mean score in the dimension "Psychological/Emotional conflict" was 0.77 points (SD=0.67 points), in the dimension "Time management" it was 1.50 points (SD=0.89 points) and in the dimension "Neglect work" it was 1.26 points (SD=0.98 points). The mean total score was 21.71 points (SD=14.18 points). Based on the Kolmogorov-Smirnov normality criterion, the IAT scale dimensions were not normally distributed.

As far as the addiction level of the participants is concerned, the majority of the participants had normal levels of internet addiction, with the percentage being 77.1%.

Descriptive measures of the DASS-21 scale dimensions are given in table 1. The mean score on the anxiety scale was 2.97 points (SD=3.56 points), on the depression scale it was 4.35 points (SD=4.06 points), on the stress scale it was 6.10 points (SD=4.58 points) and on the total score the mean value was 13.43 points (SD=10.56 points). Based on the Kolmogorov-Smirnov normality criterion, the dimensions of the DASS-21 scale were not normally distributed.

	Minimum	Maximum	Median	P	
	value	value	Mean (SD)	(indicatively. width)	Kolmogorov - Smirnov test
Κλίμακα κατάθλιψης	0,00	20,00	4,35 (4,06)	3 (1 – 6)	<,001
Κλίμακα άγχους	0,00	18,00	2,97 (3,56)	2 (0 – 4)	<,001
Κλίμακα στρες	0,00	18,00	6,10 (4,58)	6 (3 – 9)	,004
Συνολικά κλίμακα DASS-21	0,00	49,00	13,43 (10,56)	12 (6 – 18)	,009

Table 1: DASS-21 scale descriptive measures and normality testing

The participants' anxiety, depression and stress levels are given in table 2. 60% of the participants had normal levels of depression, 68.6% had normal levels of anxiety and 64.8% had normal levels of stress.

		N	%
Depression levels	Normal	63	60,0
	Mildly	16	15,2
	Moderate	18	17,1
	Seriously	6	5,7
	Very seriously	2	1,9
Anxiety levels	Normal	72	68,6
	Mildly	8	7,6
	Moderate	17	16,2
	Seriously	3	2,9
Stress levels	Normal	68	64,8
	Mildly	14	13,3
	Moderate	11	10,5
	Seriously	8	7,6
	Very seriously	4	3,8

Table 2: Depression, anxiety and stress levels

There were significant positive correlations between all dimensions of the IAT and DASS-21 scales (Table 3) as well as total scores, $\rho = .57$, $p < .001$. Therefore, the more internet addiction symptoms the participants had, the more depression, anxiety and stress symptoms they had.

	Depression scale	Anxiety scale	Stress scale	Overall scale DASS-21
Psychological/Emotional conflict	,41***	,45** *	,48** *	,51***
Time management	,35***	,39** *	,48** *	,46***
Neglect work	,41***	,44** *	,50** *	,52***
Total IAT score	,45***	,49** *	,55** *	,57***

* $p < .05$ ** $p < .01$ *** $p < .001$

Table 3: Spearman's correlation coefficients (rho) between IAT and DASS-21 scales

Linear regression models were then made with the dimensions of the DASS-21 scale as dependent variables and the characteristics of the participants and the total score on the IAT scale as independent variables, the results of which are given in table 4. It was found that the correlation of the addiction scale with the scale DASS-21 remained significant and positive, taking into account participant characteristics. Regarding the characteristics of the participants, it was found that the educational level and family

status were significantly related to the depression scale. Specifically, higher educational level was associated with fewer depressive symptoms, $\beta=-0.056$, $t(98)=-2.04$, $p=.044$. Also, married and cohabiting individuals had significantly fewer depressive symptoms, $\beta=-0.166$, $t(98)=-2.43$, $p=.017$. Participant characteristics were not related to the remaining dimensions of the DASS scale ($p>.05$).

Dependent variables	Independent variables	$\beta+$	SE++	b+	t
Depression scale $F(6,98)=6,52$, $R^2=0,24$, $p<,001$	Gender (males vs females)	-0,056	0,069	-0,069	-0,81
	Age (in years)	0,000	0,004	0,000	0,00
	Higher education	-0,056	0,027	-0,180	-2,04*
	Married/ In cohabitation(yes vs no)	-0,166	0,068	-0,229	-2,43*
	Do you use the Internet for work? (yes vs no)	0,033	0,085	0,035	0,39
	Total IAT score	0,010	0,002	0,409	4,54** *
Anxiety scale $F(6,98)=5,83$, $R^2=0,22$, $p<,001$	Gender (Men vs Women)	-0,090	0,070	-0,112	-1,29
	Age (in years)	-0,002	0,004	-0,062	-0,63
	Higher education	-0,009	0,027	-0,029	-0,33
	Married/ In cohabitation (yes vs no)	-0,020	0,068	-0,028	-0,29
	Do you use the Internet for work; (yes vs no)	0,101	0,085	0,107	1,18
	Total IAT score	0,011	0,002	0,444	4,85** *
Stress scale $F(6,98)=7,66$, $R^2=0,28$, $p<,001$	Gender (men vs women)	-0,081	0,066	-0,103	-1,23
	Age (years)	-0,002	0,004	-0,058	-0,61
	Higher education	-0,030	0,026	-0,099	-1,15
	Married/ In cohabitation (yes vs no)	-0,060	0,065	-0,085	-0,92
	Do you use the Internet for work? (yes vs no)	0,128	0,081	0,139	1,59
	Total IAT score	0,012	0,002	0,472	5,36** *
Overall scale DASS-21 $F(6,98)=8,43$, $R^2=0,30$, $p<,001$	Gender (men vs women)	-0,085	0,076	-0,092	-1,11
	Age (years)	-0,002	0,004	-0,057	-0,61
	Higher education	-0,043	0,030	-0,122	-1,44
	Married/ In cohabitation (yes vs no)	-0,098	0,075	-0,119	-1,31
	Do you use the Internet for work? (yes vs no)	0,135	0,093	0,124	1,45
	Total IAT score	0,014	0,003	0,484	5,59** *

* $p<,05$ ** $p<,01$ *** $p<,001$

Table 4: Results of multivariate linear regression with DASS-21 scale dimensions as dependent variables

Discussion:

The purpose of the present study was to examine the relationship between increased Internet use and mental health in adults. As can be seen from the demographic data of the survey, the participants were mainly women, with a percentage of 73.3% of the total sample, while the educational level of the majority of the sample was university (university graduates or postgraduates) and the average age was 36, 4 years. Almost all participants ($n=105$) had an account on a social networking page. In this sample, there did

not appear to be severe Internet addiction, as the majority of participants had normal levels of Internet addiction, with the percentage being 77.1%. Regarding the characteristics of the participants, it was found that the educational level and family status were significantly related to the depression scale. Specifically, higher educational level was associated with fewer depressive symptoms. Also, married and cohabiting couples had significantly fewer depressive symptoms. According to several studies, teenagers and younger people are more likely to become addicted to the Internet and digital technologies than older people,

as they are more prone to use and accept new technologies, compared to people of an older generation. In addition, adults with a higher educational level were less likely to experience depressive symptoms [8]. Therefore, age and educational level seem to have some importance in the general state of health. Regarding the characteristics of the participants, they did not seem to be related to the dimensions of DASS scale, except for depressive symptoms. There are studies that link the levels of mobile phone addiction mainly to the female gender, while there is a correlation of internet addiction mainly to the male gender. One study specifically found that men tend to use the Internet mainly for online gaming or gambling, while women use social media more for messaging [9]. Significant positive correlations existed between all dimensions of the IAT and DASS-21 scales. The greater the participants' Internet addiction symptoms, the greater the symptoms of depression, anxiety, and stress. This finding is confirmed by earlier studies, such as that of Kim and his colleagues [10], in which it was shown that the dependence on mobile phones has a significant correlation with depression and anxiety. Specifically, the study showed that the addictive use of smartphones and the Internet increases interpersonal and family relationship problems, resulting in an increase in anxiety and depression symptoms, while withdrawal symptoms also resemble psychopathology [10]. Further research by Alhassan and his colleagues in 2018 [8] showed that mobile phone addiction significantly affects the lifestyle habits of users and their health, especially in matters of nutrition, sleep and social relationships. In another study, it was found that the problematic use of the mobile phone is related to mental health problems in the areas of self-control, anxiety, depression and impulsivity [11,12]. The number of participants in the research was a significant difficulty, as it was impossible to gather a larger sample in order to obtain more valid results. It is noted that the research was conducted during the months of April-May 2023, which may have affected the collection of a large number of samples. As mentioned above, women outnumbered men, so the gender factor was not properly examined. In addition, the survey was aimed at the age group of 18-65 years, but the average age of the participants was 36 years. This factor may have influenced the findings related to age and education. For this reason, the inconsistency of the research may be due to these limitations of the study.

The Internet has greatly influenced human behavior, both positively and negatively. Despite the benefits it has offered to modern life, extensive and problematic use exposes its users to addictive behaviors towards the Internet and new digital technologies more broadly [12]. Social media engagement appears to be associated with adolescent depression, as young users create a false self-image, compare themselves to others exposed to the Internet, are affected by negative comments, and experience loneliness [13-15]. The constant use of the mobile phone also has problematic effects on the mental health of the users and can cause addiction. Addicted cell phone users seem to be in a vicious cycle where, due to emotional or other difficulties, they use the cell phone in order to overcome their stress or feel better. However, the result is that the addiction itself has a negative impact on their social, emotional and physical well-being [8].

Conclusion:

The priority of this research is to benefit the scientific and therapeutic community to come into more substantial contact with the real needs of Internet users, as well as to suggest the conduct of further research, specialized in the population group of teenagers. In addition, as mentioned, the gender factor was not examined, due to the small sample size of young men. Further investigation of this factor is suggested. From the literature search and the findings of the present research, it is observed that due to the increasing presence of social media and the rapid development of the use of the Internet and mobile phones, pathological use can lead to the so-called "Internet addiction" [5] and subsequently to poor quality of life and the appearance of mental health problems. Prevention and proper information are considered necessary, in order to avoid the effects mentioned above, but also to utilize these means in the best possible way.

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