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Original Research

Partial Least Squares in Explaining the Relationship between the Using of Information and Communications Technology (ICT) Tools with Teenagers' Depression

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Abstract

Information and communications technology (ICT) are interactive technologies that allow the creation or sharing/exchange of information, ideas, career interests, and other forms of expression via virtual communities and networks (Internet, Instagram, and Telegram). The purpose of the present study is to prepare a structural modeling approach to explain the relationship between using ICT tools (cell phones, Internet, Instagram, and Telegram) and teenagers' depression in Maku Free Zone. The research hypotheses were tested with survey methods. The study population was adults between 17 to 18 years of age. In total, 265 participants were randomly selected according to Morgan Table and then the information was collected through questionnaires. Data analysis was carried out using structural equation modeling SMART PLS. The findings showed that there was a significant positive correlation between the use of ICT tools (Cell Phones, Internet, Instagram, and Telegram) and teenagers' depression in the Maku Free Zone. Therefore, the misuse of the internet, cell phones, and social networks caused fewer face-to-face encounters and made them more introspective. In this way, individuals began to distance themselves from direct communication that resulted in depression and loneliness.

Keywords: Internet, Instagram, Telegram, Mobile, Depression, Maku Free Zone.

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Introduction

Undoubtedly, Information and Communication Technology (ICT) has caused many changes in all fields of social and economic developments of mankind and its impact on human societies is such that the world is rapidly becoming a unified society of information and communication. In the last fifty years, extensive developments in the field of computers and communications resulted in major changes in various fields of human life(Webster, 2014). Humans always used technology and human life recorded numerous innovations in terms of information and communication technology that can be dubbed as novel and high techs and means of communication which in turn greatly influenced his life. The world of information and communication is rapidly changing in today's world and we can see them converged more than ever with each other in a way that data and information is transferred quickly across the world and become more accessible for the users (Leu et al., 2004). Today we live in an age in which ICT has become more institutionalized than ever in human life. Including the use of the Internet and more specifically social networks (telegram, Instagram, etc.). Besides their main role of sharing information, they are culturally attractive and absorb users through their attractiveness. That's why some believe that these networks hamper the development of social communication facet of youths' personality this is while, young people communication is dynamic, and they can develop skills and perfection in their behavior, increase their sensitivity to others and understand their self-evaluation and as a result show more complicated behaviors (Pachucki et al., 2015).

Cell phone, as an essential tool in daily life, has directly and indirectly affected human relations and interactions (Chen & Katz, 2009). To the youths, the current cell phones are the main means of entertainment besides their function as means of communication, connection to the Internet and social networks. This fact causes increased dependence of young people on cell phones, and ultimately brings some problems (Al-Barashdi et al., 2015). (Ehrenberg et al., 2008) argued that excessive use of cell phones brings addiction. Because of loneliness, depression, and isolation that are the consequences of the new communication technologies social relations have been decreased in reality and resulted in a reduced level of welfare (living standard, and life quality) (Kraut et al., 1998). By developments in Internet and ICT with their full swing throughout the past two decades, more novel and different facilities have been provided for structuring organizations and doing jobs (Hood, 2007). Internet is one of the communication means in the modern era. Using the Internet is one new facet of the modern world and it is a vital tool for training new generations. Internet is everywhere: at home, at school, and even in shopping centers (Biggs, 2000). Most Internet users are teenagers and young people. A study in the United States indicated that Internet use among young people is more than any other age group (Bullen & Harré, 2000). Along with widespread access to the internet, a new type of addiction can be seen that is called "Internet addiction" which is the specific problem of the information age. Like all other types of addiction, "Internet addiction" is associated with symptoms such as anxiety, depression, irritability, restlessness, obsession, or daydreaming about the Internet. Given the fact that the relations between this age group (especially children and teenagers) in the virtual world increase day by day, therefore the scope of their relations in the real world declines, and it emerges the possibility of hurting their educational performance. However, here, family is the most suitable system to fulfill the material, mental and spiritual needs of individuals and it is the best platform to provide

members' security and mental relaxation, nourishing the new generation and socializing children, and meet their emotional needs(Bartlett et al., 2016). The obvious problem here is that the families usually do not have a balanced and reasonable look toward their children's use of the internet and these issues accompanied by problems such as recreational and unscientific use of the internet, having access to immoral issues, the lack of prohibitions and limitations regarding the use of the internet for different populations and so on (Bullen & Harré, 2000). An asocial network is a network of individuals, groups, and reconnections. Its name firstly was coined by William Gibson in his novel called Nurmanser(1984) (Holmes, 2005). Social networks are a new generation of communication that is interesting to the users. When it comes to talking about cyberspace, people often think about computer games while this is only one small part of cyberspace. From the perspective of (Dixit et al., 2010), cyberspace is not merely a collection of hardware it is a collection of a symbolic set of definitions that exchanges a network of ideas and beliefs in the form of barter. Cyberspace is the name that compromises a large number of today's applications of new communication technologies. New communication technologies (Telegram[2], Instagram[3]) dictate themselves to us. New technologies by their new software make us needless of learning many arts and crafts. And in fact, the professional world experiences a deskilling process (Branston & Stafford, 2010). Hundreds of millions of internet users are already the members of hundreds of different social networks and a part of their daily online activities happen inside these networks(Trusov et al., 2010).

The results (Pashaie et al., 2017) showed that, information and communication tools (Internet, Mobile and Virtual Networks) cause depression in teenagers, and sports participation as a mediator variable can reduce the negative impact of information and communication technology tools on teenagers' depression. Therefore, the use of Internet, mobile and virtual networks causes loss of face to face communication because of the creation of false appeal to users and causes people to be introspective. Therefore, people will stay away from direct communication, and finally this will result in depression and loneliness. (Selkie et al., 2015) reported that the use of new technologies and high frequency of cell phone use causes mental problems including depression among college students. The results of Stanford University research showed that Internet users spend less time being with their friends and families or go shopping or even reading newspapers and watching TV (Masserat, 2008). The findings of (Morahan-Martin & Schumacher, 2000) revealed that internet addicts were lonelier and depressed when compared with those who were not dependent on the internet and merely used it as a means of entertainment. (Wellman et al., 2001) found that more usage of virtual networks and the Internet reduces family relationships and increases depression. A study by (Kircaburun, 2016) about the social effects of the Internet on young people showed that as internet usage got is higher the more they became depressed. Also, the results of (Campbell, 2004) showed that cyberspace creates an identity workshop wherein people learn social skills and practice them. (Kamibeppu & Sugiura, 2005) findings showed that students' physical and psychological health was affected by the excessive use of cell phones.

[2]An instant messaging service, open text and multiplatform is a cloud-based or external links.
[3]A photo-editing program and it share on phones with Android operating system is installed and the possibility to you that from your daily life, a good photograph and share with your friends.

However, the number of social network users almost doubled during 2008-2010 while, at the same time, the number of users is rapidly increasing. According to Internet World Stats Centre, Iran ranks first in the number of internet users in the Middle East in 2010 (Hampton et al., 2011). When a person gets a teenager he/she faces many challenges. Teenagers usually have special problems to which in childhood they did not face with. The nature of these problems varies from those of adulthood. At this time, teenagers are not fully adapted to their role and thus are often confused, uncertain, and anxious. Physical changes are associated with mental changes at this period. Among teenagers, the level of self-confidence is greatly affected due to body changes which may result in depression. The Korean researchers say that the more is dependence working time of teenagers to the internet, the more they show depression signs (Wolff, 1999).

Iran is going to connect to the global information world. And day by day, the number of Internet users, cell phones, and virtual networks is increasing. Many of these users are young people. Statistics show that over 30 million Iranians are active in social networks or non-native messaging systems. Social networks (telegram and Instagram) have been common over the past decade with the rapid spread among Iranian users and millions of people have joined these networks so that these networks have become an integral part of life for most users. Therefore, the number of social network users (Instagram, Telegram), users of cellphone and the internet among young adults and their effects on various social, personal and familial aspects can be a good justification to do this investigation. By doing so, the present study tries to identify the effects of this new phenomenon and deal with it where possible. Thus it is essential to study the effects of the communication tools of information technology (Cell Phone, Internet, Instagram, Telegram) so that we get aware of its effects on our social life. Therefore, in this study, we discuss a model that represents the relationship between the use of communication tools of information technology (cellphone, Internet, Instagram, telegram) and depression among teenagers in Maku Free Zone, West Azerbaijan, Iran[4]. For this, the theoretical framework was designed to answer this question that comes in Figure 1.

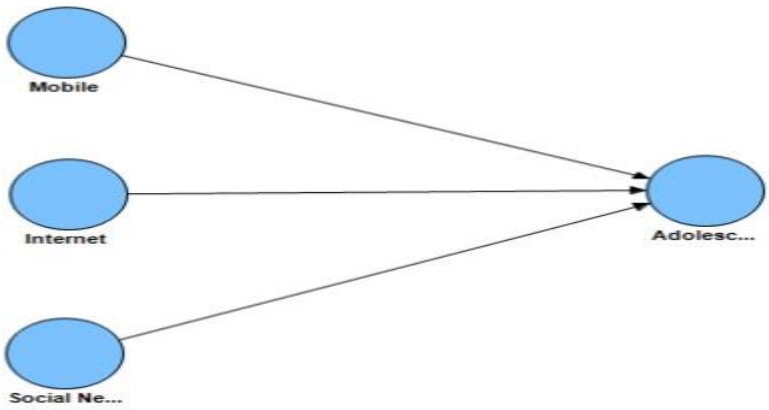

Figure 1. Conceptual model of research

[4]Maku Free Zone is (a combination of three city Maku, Shot, Poldasht) as the one of the most important free zones in West Azerbaijan Province is and yet the largest free trade zone and industrial the area is in the Middle East on the other side of the border between Turkey and Azerbaijan.

Methodology

The present study was in a type of correlational and according to the purpose, it was functional. In the present investigation, the data collection process was done inside the work field. The statistical population, based on official statistics of the Ministry of Education was 838 students aged between17-18 and from Maku Free Zone (three cities: Maku (240 girls, 160 boys), Shot (125 girls, 134 boys); Poldasht (male 99, female 80) who were recruited in 2019-2020. The sampling process was carried out in a randomized way and according to the Morgan table and finally, a total of 265 were selected as the sample size.

Structural Equation Modeling (SEM) is a comprehensive statistical approach to test the hypotheses about the relationship between observed and latent variables. Through this approach, the acceptability of certain orifical models in certain societies can be attained by using correlation, on-experimental, and pilot data. According to (Newsom, 2015), SEM analysis is a multivariate regression that is very comprehensive and strong that belongs to the multivariate regressions family. SEM is a comprehensive approach to test hypotheses about direct and indirect relationships between variables. By this method, the acceptability of certain theoretical models can be tested in certain populations. Confirmatory factor analysis of the minimum sample size is determined based on factors, not variables. To collect data research components, we used (Jenner & O'Neill, 2012) harmful use of cell phone questionnaire, (Yang & Tung, 2007) using internet questionnaire, (Parikh et al., 2018) teens depression questionnaire and finally researcher's made a questionnaire about the use of social networks in the form of Five-point Likert scale. To determine the reliability of the questionnaire, we assessed the questionnaire with five university professors of management, during a preliminary test in terms of content and form. We presented suggestions for better clarification of some questions and after concluding the comments, the finalized questionnaire was provided in the form of research. To examine the internal consistency and reliability, Cronbach's alpha and total correlation of all factors were studied (Table 1). Cronbach's Alpha coefficient is the most common way to estimate internal consistency that must be higher than 70% (Cronbach, 1951). Also, the total correlation of the observed variables must be greater than 3% to be acceptable (Lin & Yang, 2006). So the questions that their overall correlation was less than 3% or those questions that the Cronbach's alpha coefficient of hidden variables was improved were removed step by step (Table 1). Finally, the questionnaire was approved to have 21 questions. The reliability of survey questionnaires using Cronbach's Alpha coefficient was 0.85 for the whole questionnaire. Also, alpha values for the cell phone, internet, teenager's depression, and social networks questionnaires were 88%, 87%, 86%, and 77%, respectively. For data analysis, we used correlation coefficient and for model design from SEM, we applied Smart PLS software.

Findings

Descriptive statistics of demographic variables are as follows: The survey showed that samples were compromised of 50% of boys and 50% girls. The majority of participants (100%) used cell phones and they were familiar with the Internet and cyberspace. About 75/40% of the samples spent 3-4 hours a day with their cell phones. The highest use of

the internet (per week) and virtual private network (Instagram, telegram) per day among the participants were respectively 68/48, 03/46. The details are specified in Table 1.

Table 1 Frequency distribution of demographic variables

Variable		N	%
Age	17-18	248	100
Sex	Female	124	50
	Man	124	50
User use mobile		248	100
Mobile usage per day (hours)	Less than 1	70	20.82
	2-3	91	31.69
	3-4	105	40.33
	4 up	30	08.02
Familiarity with the Internet and cyberspace	Yes	248	100
	No	0	00.00
Internet usage in the week (hours)	Less than 1	11	04.43
	2-4	36	14.51
	5-7	119	47.98
	8 to the top	82	33.00
The amount of virtual network usage per day (hour)	Less than 1	19	07.66
	2-3	36	14.51
	3-4	71	28.62
	4 up	122	49.16

Correlation Analysis

The mean (M), standard deviation (SD), and coefficients of correlation of hidden variables in the model are illustrated in Table 2. Correlations can only reveal the degree of relationship between structures. To further understand the direct and indirect effects of structures excessive analysis is required by SEM. In this paper, the least observed correlation of variables was 74%. This indicates that the variables have internal consistency and as a result, it approves the internal consistency of the questionnaire.

Table 2. The mean, standard deviation and correlation matrix variables

Variables	M	SD	Mobile	Internet	Social Networks	Adolescent Depression
Mobile	3.17	0.76	1			
Internet	3.16	0.86	0.77	1		
Social Networks	3.20	0.68	0.74	0.74	1	
Adolescent Depression	3.18	0.74	0.87	0.83	0.83	1

Results

Model Evaluation Method

SEM approach is administered according to the flexible interaction between theory and research data and also the linking of experimental and theoretical data to have a better understanding of the real world. In those cases, in which most described structures are outcomes of phenomena, such analysis of modeling the observed and hidden variables is acceptable. SEM includes measurement errors, multi-indexed variables, and multiple groups' scales.

The first factor that must be considered in the assessment of evaluation models, is the one-dimensionality of the evaluation model. It means that each index in the set of indicators, with a big load factor, must be loaded with only one latent variable or dimension. For this, the amount of load factor must be larger than 60% and the load factor less than 40% should be considered small and must be removed from the set of indicators (Gefen & Straub, 2005). Therefore, items that had lower load factors were excluded.

The value of the Composite Reliability (CR) ratio is another factor in assessing the reliability of the internal consistency of evaluation models. The value of this ratio varies from 0 to 1. Values over 70% are accepted and less than 60% are considered unsatisfactory (Gefen & Straub, 2005). Convergent Validity shows the high correlation of indicators of a structure compared with the correlation of the other structures that must be used in the evaluation of the models. To evaluate the convergence validity, we used AVA from Smart PLS software. The value of this ratio also varies from 0 to 1, that the amounts higher than 50% are accepted. Credit Recognition indicates that the validity of the diagnosis indicates that the measure must be evaluated in models. Former and Larkrel criterion refers to the fact that the square root values of Average Variance Extracted (AVE) of any structure are larger than the values of the correlation of that structure with the other structures. Communality measures the quality structure evaluation model (before testing the hypotheses it is better to assess the quality of the internal or structural model. The quality of the structural model means that whether the independent variables can predict the dependent variables or not? In this case, the cross-validation redundancy criterion is used). Redundancy item index by considering the type of measurement model measures the quality of the structural model for endogenous structure. If commonality or redundancy items are positive it shows the good quality of that measurement model. R Square index is used to get informed about the percentages of predicted changes by every variable. The results of Table 3 show that all structure models have acceptable combined validity indicating the reliability of the model is fulfilled.

Table 3. Combined validity of each of the structures

	AVE	Composite Reliability	R Square	Cronbach's Alpha	Communality	Redundancy
Mobile	0.68	0.91		0.88	0.68	
Internet	0.75	0.91		0.87	0.78	
Social Networks	0.54	0.81		0.77	0.44	
Adolescent Depression	0.58	0.89	0.87	0.86	0.58	0.30

Analysis of Structural Model

After the assessment of evaluation models, we go to evaluate the structural model. At this stage, the researcher investigates coefficient algebraic symbols, size, and the level of significance. The size of the coefficient indicates the strength of the relationship between two latent variables. Some researchers believe that a path coefficient greater than 100% indicates a certain amount of influence in the model. The obtained results for path coefficient and the level of its significance are shown in Fig. 2 and 3.

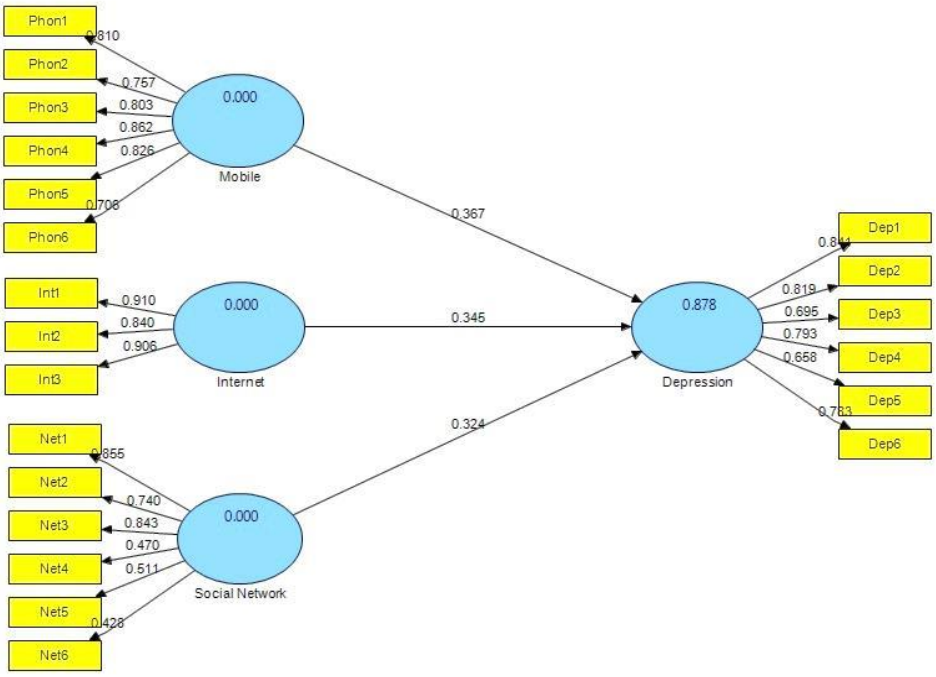

Figure 2. Results modified path model

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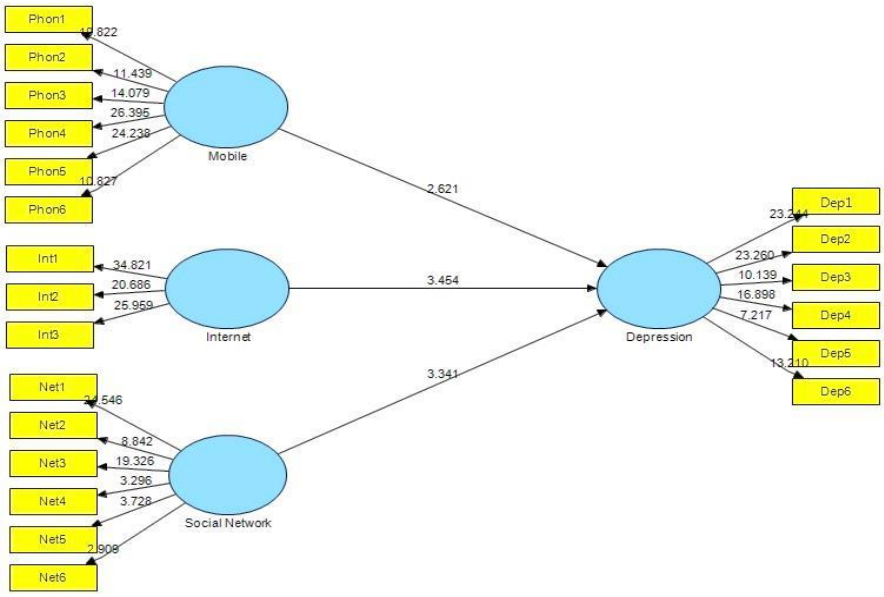

Figure 3. Results modified t-test

In "PLS" software "T" values shows the meaningfulness of the effect of variables on each other. If it is between +1/96 and -1/96 it shows no significant effect and if it would be smaller than 96/1 then there is a negative effect but it is meaningful. The "T" value is the main criterion to affirm or reject hypotheses. If the amounts get higher than 1/64, 1/96, and 2/58, then we conclude that the hypothesis is respectively confirmed on the levels of 90, 95, and 99 percent. If the path coefficients are above 0.6, it means that there is a strong correlation between the two variables. If between 0.3 and 0.6, it's average, and if below 0.3, there would be a weak linkage. Also numbers higher than1.96 are significant at the level of 0.05 and above 2.58 they are meaningful at the level of 0.01 (Table 4). It must also be said that if the path coefficient ratio value between the independent latent variable and dependent latent variable is positive, we conclude that an increase in the independent variable leads to the increase independent variable and vice versa. If the path coefficient value between the independent latent variable and dependent latent variable is negative, we conclude that with an increase in the independent variable we will see a decrease in the dependent variable. The «R2» value reflects the ability of the model to describe the structure. It represents the model fitness and shows what percentage of the dependent variable is explained by the independent variables. The more it is close to 1 the more fitness it shows:

Table 4. Path and significantly

	Directions (hypothesis)	B	T	Sig	Affect Direction	Result
1	Mobile ➡ Adolescent Depression	0/36	2/62	0/01	+	Confirmed
2	Internet ➡ Adolescent Depression	0/34	3/46	0/01	+	Confirmed
3	Social Networks ➡ Adolescent Depression	0/32	3/34	0/01	+	Confirmed

Given the significance of the relationship between variables hypothesis we can focus on the final research model. Fig 4 shows tests results based on SEM study, causal pathways regression coefficients and indices along with details. As can be seen, all the hypotheses are confirmed at the 99% confidence level and are significant at the 0.01 level.

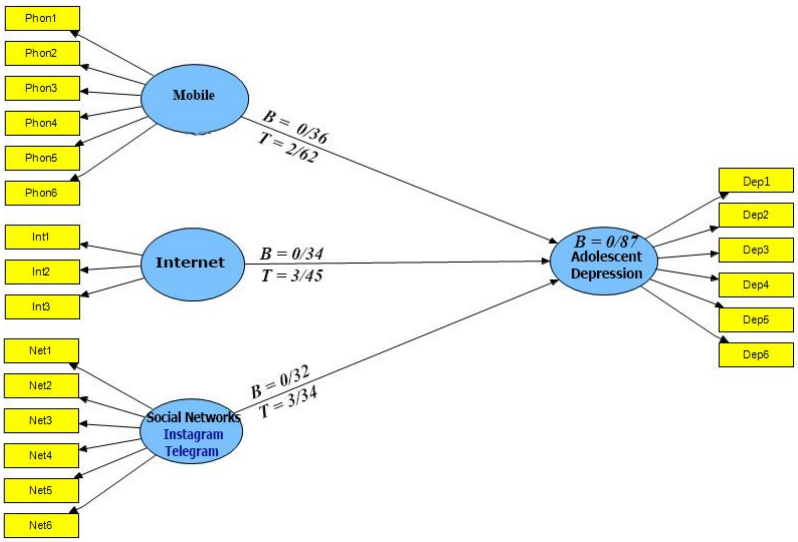

Figure 4. The final research model

Discussion and conclusion

Today, information technology has prepared the ground for the unbelievable speed of information exchange and there is no imaginable obstacle to hamper the speed. Teenagers who are the main players of this exchange need to know and be recognized more than ever. To understand their real and practical needs it is necessary to study various influential aspects factors in this regard. Therefore, in the present investigation, a model was proposed and it was tired to study the relationship between the usages of communication tools of information technology (Cell Phone, Internet, Instagram, and Telegram) and depression among teenagers of Maku Free Zone (Figure 5). The findings and main arguments are as follows:

The findings showed that there was a positive significant relationship between the use of cell phones and teenagers' depression in Maku Free Zone; therefore, it can be regarded as an effective factoring term of their physical and psychological health (withdrawal, isolation, and depression in adolescents and young adults). Accordingly, those people who use the devices frequently are more vulnerable in terms of stress, sleep disorders, and depression. This finding is consistent with (Beranuy et al., 2009; Lemola et al., 2015; Lepp et al., 2014; Pashaie et al., 2017). Using a cell phone gets more common every day in societies. Many individuals effectively use these new communication tools and a variety of cell phones with the newest technologies are at hand in the markets. Today's world is the world of television, satellites, computers, the internet, and cell phones. One cannot be indifferent toward these phenomena as they have deeply penetrated and

disseminated in humans' life. This phenomenon must be treated appropriately to be highly beneficial. It can be concluded that the fewer teenagers use these devices the less they will have stress and anxiety will have a better mental condition. Those who use cell phones less than 1 hour a day compared with those who use3 to 4 hours and more had better psychological conditions, better sleep at night, less anxiety and stress, good educational procedure, and are more energetic and active people.

We also found that there was a positive and significant relationship between the use of the internet and depression among teenagers in the Maku Free Zone. This finding is consistent with (Bahadir; Fenglin, 2007; Pashaie et al., 2017). Therefore, it can be said that the attractions and diversity that the internet brings to teenagers make them linger a large part of their time in it. Even though the internet can be a useful device for education and even working, its utilization cannot be without problem. One of the problems is that people don’t have a clear-cut understanding of time passage when they surf the internet and suddenly realize that they have spent 5 or 6 hours of their time. Sometimes the matter gets worse and, some people use the internet as advice for entertainment or to fill leisure time.

Finally, the study showed that there is a positive and significant relationship between social networks (Instagram, Telegram) and depression among teenagers in Maku Free Zone. Social networks can make fundamental changes in one's lifestyle and even in the culture of different communities. These networks can affect people's literature.

The results are consistent with that of(Amichai-Hamburger & Vinitzky, 2010; Tandoc Jr et al., 2015). Regarding the importance of ICT sometimes these technologies not only have a positive effect but also if used improperly or being misused they will consequence in problems. So those who are addicted to social networks experience more negative feelings including depression when compared with ordinary people. If you think you're sad or you feel a little depressed it is better to take a rest and keep your distance from social networks.

Educational organizations can play a vital role by holding briefing classes, teaching students how to use the cell phone, Internet, and virtual networks. It informs people about the negative effects (moral corruption, depression, etc.) of using this type of communication tool. Therefore, to design and develop a part of textbooks to know more about new technologies seems to be necessary. It must be noted that besides long-term psychological and mental problems, this addiction can cause different socio-economic and cultural problems. For this reason, having an understanding of methods or techniques that can reduce internet surfing time is a vital issue.

It is hoped that cultural institutions would prepare a safe ground for teenagers to use the internet. It can be reached by planning, designing, and adequate training on how to use the internet and social networks. Therefore, officials must predict the most appropriate management approaches to achieve an optimal level.

Competing interests

We would (authors) wish to confirm that there are not any known conflicts of interest related to this publication which no significant support has been provided to influence the result of this research.

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