ORIGINAL RESEARCH

The Relationship between Smartphone Addiction and Quality of Life among Students at Tehran University of Medical Sciences

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Main Points

- A significant inverse relationship exists between smartphone addiction scores and the quality of life scores for physical, mental, and social aspects.
- Smartphone addiction scores are significantly higher for females, bachelors, and married students.
- The improper use of smartphones can have negative effects on students' quality of life and health.

Abstract

Based on the increase of smartphone addiction among students, understanding the effects of smartphone addiction on students' health is essential for developing appropriate interventions. This study has been conducted in order to investigate the relationship between smartphone addiction and quality of life among students at Tehran University of Medical Sciences (TUMS). This cross-sectional study has been performed using the stratified sampling method on 320 TUMS students in 2017. The data collection tool includes a demographic questionnaire, the Cellphone over-use Scale (COS), and the World Health Organization's Quality of Life questionnaire (WHOQOL-BREF). Data have been analyzed through SPSS 18 using the t-test, ANOVA, Pearson' correlation coefficient, and multiple linear regressions. Students' mean age is 24.45 ± 4.46; 45.6% are male. A significant inverse relationship exists between smartphone addiction scores and the quality of life scores for physical, mental, and social aspects ($p<0.05$). Smartphone addiction scores are significantly higher for females, bachelors, and married students ($p<0.05$). The smartphone addiction score determines 6% of the variance in quality of life. Alongside addiction, smartphone overuse may negatively influence the physical, mental, and social aspects of students' quality of life.

Keywords: Addictive behavior, smartphone, smartphone addiction, quality of life

Introduction

The World Health Organization (WHO) defines quality of life as individuals' perceptions of their position in life in the context of culture, educational system, and life's purposes, expectations, standards, and priorities. Quality of life is an extensive concept sophisticatedly influenced by one's physical health, mental condition, personal beliefs, and social relationships, as well as important environmental characteristics (World Health Organization [WHO], 2014).

One important factor that can be effective on humans' life and various health aspects is technology.

Smartphones are an important technology that have quickly developed, are considered a major resource of information, and are accessible by most people in today's world (Kumcagiz, 2018; Lu et al., 2018). Smartphones are considered as an important communication tool, an inseparable part of society, and an essential social tool especially for young people (Gao, Xiang, Zhang, Zhang, & Mei, 2017; Goswami & Singh, 2016). The number of mobile phone users was estimated at 4.7 billion in 2017. This is expected to exceed 5 billion in 2019 (Statista, 2018). The smartphone's portability, constant access, and various applications such as Internet access have developed a usage that sometimes causes addiction (Montag et al., 2015). Smartphone addiction occurs when a person spends a lot of time using a smartphone and this extra usage is able to impose negative effects on life, such as deep impacts on one's physical and mental health (Jiang, Dandan, Jianlin, & Hua, 2015). Physical problems include blurred vision, headaches, earaches, inability to focus, and fatigue (Johansson, Nordin, Heiden, & Sandstrom, 2010; Korpinen & Paakkonen, 2009), and mental problems include depression, anxiety, and sleep disorders (Im, Hwang, Choi, Seo, & Byun, 2013; Park & Lee, 2012; Yun et al., 2011). Nevertheless, the need for studies to examine the impact of excessive smartphone use on quality of life appears necessary as an important outcome. Limited studies have shown mobile phone addiction to be able to negative affect quality of life. The results from a study on Chinese university students showed quality of life to significantly and negatively correlate to smartphone addiction (Gao et al., 2017). A study on Turkish students (Kumcagiz, 2018) has suggested the dimensions of physical and psychosocial health as well as overall quality of life to negatively correlate to smartphone addiction.

Students use various smartphone applications and have been more exposed to its complications in recent years (Aaron, Lee, & Kathryn, 2011; Smith, 2015). As active members of the community, understanding the patterns of smartphone addiction, their associated factors, and their effects on students' health is essential in developing appropriate interventions. However, to our knowledge, limited research has studied the relationship between smartphone addiction and students' quality of life. Therefore, this study was conducted for investigating the relationship between smartphone addiction and quality of life among students at Tehran University of Medical Sciences (TUMS).

Methods

Study Population

This cross-sectional study has been performed on TUMS students in 2017. Stratified sampling has been conducted by considering various schools and students' gender'; the required sample was selected through students' lists from each school in proportion to its size using the simple random sampling method. The sample size was estimated at 320 individuals using Krejcie and Morgan's (1970) table. The study's target population is medical science students in Iran.

Data Collection Tools

Data have been collected using the Cellphone Overuse Scale, WHO's Quality of Life questionnaire, and demographic information.

World Health Organization's Quality of Life Questionnaire-Brief (WHOQOL- BREF)

This scale is the brief form of the 100-question Quality of Life Scale made by a group of experts from WHO (1996). This scale has 26 questions that evaluate four aspects (physical, mental, social, and environmental) of health; each aspect has seven, six, three, and eight questions, respectively. The first two questions generally evaluate quality of life and health conditions, respectively. Each question is individually assessed using a 5-point Likert-type scale. Possible scores range from 26 to 130 for each person, with higher scores showing a better quality of life. This scale was translated by Nejat et al. (2006) to Persian, and its validity and reliability have been confirmed with Cronbach's alpha coefficient being greater than 0.7 for the dimensions of physical, mental, and environmental health and 0.55 for social relationships. Because the total score for quality of life is not calculated by this scale, the mean scores from the dimensions of quality of life have been used as the total score for quality of life in the statistical analyses. The calculation method for the mean score from the dimensions of quality of life included: ((physical + mental + social + environmental health) /4).

Cellphone Overuse Scale (COS)

This scale was made by Jenaro, Flores, Gómez-Vela, González-Gil, & Caballo (2007). The original scale has 23 items, whereas the Persian version has omitted two questions, resulting in 21 items. This scale has no sub-scales or sub-factors, and each question is assessed using a 6-point Likert-type scale. Individuals can achieve a score between 21 and 126, with higher scores showing greater smartphone overuse and addiction. This scale has been translated to Persian by Golmohammadian and Yaseminejad (2012), and its validity and reliability have been confirmed through Cronbach's alpha coefficient (α=0.9).

The demographic scale includes questions about age, gender, school level, degree, and marital status. Before collecting the data, the study objectives were explained to the students with ethical considerations assuring that the researchers would keep all information private.

Statistical Analysis

Finally, after collecting the data and entering them into the Statistical Package for the Social Sciences Released 2009. PASW Statistics for Windows, Version 18.0. (SPSS Inc.; Chicago, IL, USA) and providing descriptive statistics, the data were analyzed using the independent t-test, one-way ANOVA with Tukey's test, Pearson's correlation coefficient, and multiple linear regression. A two-sided α<0.05 is considered significant. Cohen's d effect size has been calculated using the Psychometrica online calculator (Lenhard & Lenhard, 2016).

Results

Of the 320 students participating in the study, 146 (45.6%) are male and 174 (54.4%) are female. The mean age of participants is 24.45±4.46 years with a minimum age of 18 and maximum of 47 years old. Of the participants, 129 students (40.4%) have a Bachelor of Science degree, 142 (44.4%) a Master of Science degree, and 49 (15.3%) a Doctorate's degree. Moreover, 241 (75.3%) were single and the rest were married. Table 1 shows descriptive information for the mean, standard deviation, minimum, and maximum values of quality of life and its sub-dimensions, as well as the variables from the smartphone addiction scores.

The independent t-test shows smartphone addiction scores to significantly differ by gender and to be significantly higher for

female students (p=0.0001). Moreover, a significant difference exists in smartphone addiction scores according to marital status (p=0.034), with married students' scores being significantly higher. ANOVA also shows significant difference in smartphone addiction scores according to degree (p=0.023), with mean scores for smartphone addiction being significantly higher for Bachelor of Science students than for Master of Science students (p=0.009) (Table 2).

Pearson's correlation coefficient shows a significant inverse relationship for smartphone addiction score with the mean scores for the physical, mental, and social health sub- dimensions of quality of life (p<0.05). Thus, smartphone addiction reduces students' physical, mental, and social performances and general quality of life while not having a significant relationship to the sub-dimension of environmental health (p=0.084) (Table 3).

Table 1.
Descriptions of Students' Scores for Smartphone Addiction, Quality of Life, and its Sub-dimensions

	Variable	M	SD	Minimum	Maximum
	Smartphone Addiction	53.76	17.65	12	112
	Physical Health	24.50	3.90	11	34
	Mental Health	20.53	3.61	8	29
Quality of Life Sub-dimensions	Social Health	10.25	2.08	3	15
	Environmental Health	25.96	4.86	11	40
	Overall Quality of Life*	7.26	1.57	2	10
	Mean Score for Quality of Life Sub-dimensions	20.31	2.95	8.50	29.25

*The first two questions from the WHOQOL-BREF evaluate the overall quality of life; M: mean; SD: standard deviation.

Table 2.
Comparison of Students' Smartphone Addiction Scores by Gender, Marital Status, and Degree

Variable		Score of Smartphone Addiction M±SD	Cohen's d Effect Size	p
Gender	Male	48.85±17.04	0.528	p=0.0001[a]
	Female	57.88±17.13		
Marital status	Single	52.76±16.76	0.276	p=0.034[a]
	Married	57.41±19.60		
Degree	Bachelor of Science	57.41±17.12	0.367	p=0.009[b]
	Master of Science	51.42±18.11		
	Doctorate	50.93±16.27		

[a]Independent t-Test; [b]One-way ANOVA; M: mean; SD: standard deviation.

Table 3.
The Correlation of Students' Smartphone Addiction Scores with Quality of Life and its Sub-dimensions

Variable	Overall Quality of Life Score	Physical Health	Mental Health	Social Health	Environmental Health	Mean Score for Quality of Life's Subdimensions
Correlation with Smartphone Addiction Score	-0.286	-0.316	-0.273	-0.120	-0.097	-0.249
p	<0.0001	<0.0001	<0.0001	0.032	0.084	<0.0001

Table 4.
Multiple Linear Regression for Predicting the Mean Scores for Quality of Life's Sub-dimensions

Variable	Unstandardized B	SE	t	p	Model
Constant (a)	69.11	2.14	32.19	<0.001	r=0.24
					R^2=0.06
					F=20.32
Smartphone Addiction Score	-0.24	-0.038	-4.50	<0.001	p<0.001

Dependent variable: The mean scores for the sub-dimensions of quality of life; SE: standard error.

Multiple linear regression analysis has been used to predict mean scores for the sub-dimensions of quality of life using smartphone addiction score, gender, marital status, and degree. After inserting the variables using the forward method, only the variable of smartphone addiction score is significant (p<0.000); this variable can determine 6% of the variance in quality of life (R^2=0.06) (Table 4).

Discussion

The present study has aimed to investigate the relationship between smartphone addiction and quality of life in TUMS students. Results show a significant inverse relationship for smartphone addiction with the quality of life and its sub-dimensions. Moreover, the results of regression analysis show an inverse relationship in smartphone addiction scores' prediction of mean scores for the sub-dimensions of quality of life. The results from Amidtaher, Saadatmand, Moghadam, Fathi, Afshar, (2016) and Beranuy, Oberst, Carbonell, Chamarro, (2009) studies confirm these findings. Their studies referred to the relationship of students' addiction to smartphones to their physical and mental problems and low quality of life.

The present study has found a significant inverse relationship between physical health and smartphone addiction. The studies by Agarwal, Deepinder, Sharma, Ranga, Li, (2008), Hocking and Westerman (2003), and Yioultsis et al. (2002) also confirm these findings, showing the destructive effects obtained from frequency radio waves on the brain, heart, endocrine system, and even human and animal DNA by overusing smartphones. Electromagnetic waves can disrupt brain activity and cause sleep disturbances (Agarwal et al., 2008; Huber et al., 2000), difficulty concentrating, fatigue, headaches (Agarwal et al., 2008; Oftedal, Wilen, Sandström, & Mild, 2000), and increase the reaction times of independent behaviors (Agarwal et al., 2008; Preece, 1999); these waves can also increase blood pressure (Agarwal et al., 2008; Braune, Wrocklage, Raczek, Gailus, & Lücking, 1998). In addition, the results Gorriz & Medina (2000) study shows these waves can cause joint pain and finger and eye damage in users who overuse smartphones.

The results of the present study have shown a significant inverse relationship between smartphone addiction and mental health. The various studies conducted on the effects of smartphone overuse on mental health (Augner & Hacker, 2012; Lepp, Barkley, Karpinski, 2014; Sayyah Bargard, Olapour, Ahangari, Abedin, Heidari, 2016; Thomée, Härenstam, Hagberg, 2011; Toda, Monden, Kubo, Morimoto, 2006) are in agreement with the results obtained from the present study. These studies referred to mental problems caused by overusing smartphones, such as anxiety, lower life satisfaction than who use smartphones less, stress, depression symptoms in females, reduced self-esteem and mental capacity, eagerness to commit suicide, and symptoms such as anger and stress in those overusing smartphones. While being able to refer to smartphone overuse, the most important factors causing these mental problems are personal dependency, the demand to achieve, accessing it while working/studying, accessing to view social networks, personal intentions and ideal, and staying up late at night. These factors directly show accessible references to mental stress and symptoms. Moreover, role contradictions and a sense of guilt in being unable to respond to all messages and calls can be other factors causing mental problems (Thomée, Dellve, Härenstam, & Hagberg, 2010; Thomée, Härenstam, Hagberg, 2011).

The present study's findings have shown a significant inverse relationship between smartphone addiction and quality of life's sub-dimension of social health.

Golmohammadian, Yaseminejad, Naderi, (2013), Mansourian, Solhi, Adab, Latifi, (2014), and Austin (2001) studies referred to a significant inverse relationship between students' smartphone overuse and their social performance, which is in agreement with this study's results. Students' smartphone overuse causes symptoms such as destructive effects on relationships, signs of rejection (e.g., sense of anger, tension, depression), and functional and behavioral defects (e.g., lying, arguing, poor achievement, social isolation, fake connections) that negatively influence social performance (Nikhita, Jadhav, & Ajinkya, 2015). As mentioned in Yaseminejad, Golmohammadian, Yoosefi, (2012) study, using smartphones reduces face-to-face contact and makes people more isolated. Furthermore, the negative effect of some messages on social relationships leads people to become more isolated and separated.

A significant difference exists between female and male students regarding their smartphone addiction scores: female students overuse smartphones more. The present study's results are in agreement with those from Yaseminejad et al. (2012), Mansourian et al. (2014), Toda et al. (2006), and Beranuy et al. (2009). As such, females have more negative consequences in overusing smartphones because females tend to have indirect relationships more than males (Toda et al., 2006) and use smartphones more often to maintain social relationships and keep in touch with friends and family.

One of the most important limitations of the present study is the data collection tools, which are self-reporting. Another limitation can be referenced as the studied sample comprises students from a single university, while students in all state universities use smartphones. Therefore, the generalization of these results to other population is reduced.

Conducting research about the extensive use of smartphone among school students and other universities is suggested. Moreover, determining the relationship between smartphone addiction and quality of life for other population groups and economic social levels is also suggested.

In conclusion, the findings of this study show a significant inverse relationship between smartphone addiction and the physical, mental, and social aspects of quality of life. In addition, demographic variables such as gender, marital status, and educational degree are also effective on smartphone addiction. The improper use of smartphones can have negative effects on students' quality of life and health; therefore, appropriate interventions on educating how to correctly use smartphone and on preventing complications from its addiction seem necessary.

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