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10.4103/jehp.jehp_1038_20

Internet addiction theory-based intervention among university students: A case of health belief model

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Abstract:

BACKGROUND: The phenomenon of Internet addiction has increased due to the delay between Internet technology and the culture of using it. According to the high prevalence of Internet addiction among students and its associated complications, the present study was conducted to determine the effect of education based on the health belief model on Internet addiction status among students in Tehran, Iran.

MATERIALS AND METHODS: In this interventional study, two dormitories were divided into two groups of control and intervention in a completely random manner using the random cluster sampling method from a total of eight dormitories. Then 134 girls in each group answer two questionnaires of Young (about Internet addiction) and health belief model-based scale. After the need assessments of the primary results, intervention was performed in the experimental group in a way that a textbook based on the health belief model and ten educational text messages were sent to the students' E-mail. Two months later, questionnaires were again given to both groups. The results were analyzed with the help of independent *t*-test, Chi-square test, Fisher's exact test, Mann-Whitney test, analysis of covariance, and logistic regression with repetitive measures with GEE approach.

RESULTS: The average scores of knowledge ($P < 0.001$), perceived susceptibility ($P < 0.001$), perceived severity ($P = 0.006$), perceived barriers ($P < 0.001$), and self-efficacy ($P = 0.002$) between the two groups, had a significant difference after the intervention. The average scores of perceived benefits ($P = 0.6$), Internet addiction behavior ($P = 0.11$), and the frequency of Internet addiction ($P = 0.63$) after intervention did not have a significant difference in the two groups.

CONCLUSIONS: The results of this study show the effectiveness of educational intervention design based on the structures of health belief model on reducing the frequency of Internet addiction and adopting preventive behaviors.

Keywords:

Addictive behavior, educational intervention, health belief model, Internet, students

Introduction

Today, more than 3 billion people worldwide have access to the Internet; the Asian continent ranks first with 44%, and Iran has the highest Internet usage among countries on the continent.^[1] Many applications of the Internet and its

attractiveness led to the emergence of the phenomenon called Internet addiction in recent years that has had a negative impact on people's lifestyles due to delay in this technology and the culture of using it.^[2] The term was introduced by Yang in 1994 to describe the pathological and obsessive use of the Internet that the most important indicator of it is the person's

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How to cite this article: Ahmadi M, Rakhshanderou S, Khodakarim S, Ghaffari M. Internet addiction theory-based intervention among university students: A case of health belief model. *J Edu Health Promot* 2021;10:238.

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Received: 26-08-2020
Accepted: 28-11-2020
Published: 30-06-2021

withdrawal from others and it is accompanied with feeling of depression, loneliness, anxiety, and low self-esteem.^[3]

Statistics show that the use of Internet and the prevalence of Internet addiction are increasing. The highest rate of addiction has been among adolescents, young people, and students; this rate is 13% and 11% among Iranian men and women, respectively.^[1] Factors such as lack of self-esteem, introversion, history of failure in various fields, poor support of family members, 24-h and easy access to the Internet, mass information on the Internet, low cost, and anonymity on the Internet cause the tendency of people to the Internet^[4] that its complications affect various aspects of a person's life including physical injuries such as dry eyes, hand tremor, sleep deprivation, and food deprivation and as a result, feeling tired and losing weight, financial injuries, family injuries including loss of intimate and emotional relationships in the family, social and psychological complications such as sexual perversion, violence, addiction, antisocial behaviors, and social isolation, disclosure of personal information, academic failure.^[5] Studies conducted by Kumar and Mondal,^[6] Mahamontri *et al.*,^[7] Sadati Baladehi and Taghi Pour Javan,^[8] Solhi and Armon,^[9] Maheri *et al.*,^[5] and similar studies have proven the negative effects of Internet addiction on increasing depression, anxiety, low self-esteem, and academic failure. By controlling the quantity and quality of the Internet connection and binding themselves to its scheduled use, users can save themselves from trapping in Internet addiction and complications caused by it. This could be targeted using the therapy workshop and counseling sessions.^[10]

Considering the proof of the effect of model-based educational programs, especially the model of health belief, on changing behavioral habits and the growth of Internet addiction and its related complications,^[5] the present study was conducted with new educational methods such as electronic method of sending educational E-mails and text messages, with the aim of addressing the problems of previous interventional studies conducted in the traditional way of lectures, including lack of time in presenting content, intensive work plan of instructor and recipient, and lack of trained personnel who could provide students with the necessary information that can be accessed at any time of the day and night, without any time or space limitations, along with reducing training costs and creating diversity and attraction for students.

This study was conducted to determine the effect of education based on the health belief model on Internet addiction status in female students living in dormitories of Shahid Beheshti University of Medical Sciences.

Materials and Methods

This study is an intervention (experimental) study. The statistical population comprised female students living in dormitories of Shahid Beheshti University of Medical Sciences in 2019–2020. According to the researcher, Shahid Beheshti University of Medical Sciences has eight female dormitories. Inclusion criteria include conscious consent to participate in the study, living in the dormitory, and history of using the Internet, and the exclusion criterion is the unwillingness to continue attending the study.

The sample size for each group was 122 girls; according to the following formula and using the percentage of Internet addiction in a similar study of Maheri *et al.*^[5] with significant level of 0.05 and error 0.2, the researcher has considered 134 girls in each group according to the possible dropping:

$$n = \frac{(z_{1-\alpha} + z_{1-\beta})^2 \times (p_1[1-p_1] + p_2[1-p_2])}{(p_1 - p_2)^2}$$

The sampling method used was cluster random sampling. In this way, the researcher selected two dormitories among the eight female dormitories of Shahid Beheshti University of Medical Sciences by random cluster sampling method and divided them into two groups of experimental and control. After gaining the consent of the university and the relevant officials, the necessary coordination was taken place with the dormitory's officials when referring to the two dormitories of intervention and control (Somayeh dormitory and Hazrat Zeinab dormitory (the way of selecting these two dormitories was mentioned earlier). It should be noted that Somayeh's dormitory had seven floors and Hazrat Zeinab's dormitory had four floors.

One of the questionnaires is the 20-item questionnaire of Young's Internet Addiction to determine the Internet addiction status (Cronbach's alpha has been reported to be 0.89% and above in study of Hassanzadeh *et al.*)^[11] It is scored on a scale of 1-5; if the total score is equal to <49, the user is normal and if it is ≥ 50 , the user is addicted to the Internet. Another questionnaire derived from the similar study conducted by Maheri *et al.*^[5] is based on the structures of the health belief model, which includes demographic questions (9 questions) with the variables of age, job, marital status, education degree, type of Internet use (a) E-mail, (b) news, (c) film and music, (d) games, and (e) science-fictions; site of Internet connection (a) dormitory, (b) university, (c) Internet cafe, and (d) workplace; the level of Internet use (a) less than an hour, (b) 3–4 h, (c) 5–4 h, (d) 6–5 h, and (e) more than 6 h, the skill level of Internet use (a)

lack of skills, (b) basic skills, and (c) advanced skills; the grade point average, and questions related to knowledge (7 questions). In questions one and two of knowledge the scores of 2, 1, and 0 were allocated to No, I don't know, and Yes respectively. Scores of other questions were 2 for Yes, 1 for I don't know and 0 for No. The following are questions 1 and 2 in which the awareness was as follows: (1) Can the use of the Internet be a way to reduce and improve a person's depression? (2) Can using the Internet reduce a person's anxiety? For questions related to perceived susceptibility (5 questions), perceived severity (6 questions), perceived barriers (4 questions), and perceived benefits (5 questions), scoring was based on a 5-point Likert scale (agree, relatively agree, no idea, relatively disagree, and disagree) and the highest score was allocated to agree (5 score) and the lowest score to disagree (1 score). Questions related to measure self-efficacy (6 questions) were answered in the form of very low, low, medium, high, and very high, and the highest score was allocated to very high (5 scores) and the lowest score to very low (1 score). Students' scores in each of the structures will be divided by the total number of questions related to that structure by the number of questions in that structure and the result will be multiplied by 100.5 = 20. The closer the number is to 100, the less problems the students have in that structure, and *vice versa*. The validity and reliability of this questionnaire has already been proven by Maheri et al.^[5] The questionnaire was administered to ten female students in order to determine the formal validity and it was administered to eight health education specialists to determine the validity of the content, and their corrective views were reviewed. Cronbach's alpha for the whole questionnaire was 0.83 and the Pearson's correlation coefficient for the whole questionnaire was $P = 0.012$ and $r = 0.75$.

After taking the consent of the university and the relevant authorities, and obtaining the necessary permits, the necessary coordination was made with the dormitory authorities. After entering both dormitories, the researcher referred to all the dormitory rooms from the first to the last floor, and after introducing himself, the purpose of the present study, the method of educational intervention, and the executive schedule of all steps related to the participating students were explained to each student and students willing to participate in the research were provided with both questionnaires. After pretesting in both control and intervention groups in October 2019, with the help of cutoff points, a percentage of addictive Internet use was seen in both groups. After this stage, a needs assessment has been performed (with the knowledge of the scientific stages of needs assessment, including the principles of audience recognition)^[11] Considering the fact that our target group was those who have a history of daily using the Internet,

We have provided our educational content through the Internet, which they surely use during the day, and that they will use the Internet to increase awareness and use purposeful. And also to solve the problems of old intervention methods such as lecturing, two relatively new methods of E-mail and SMS have been used in this study. Educational intervention in this study was done under the supervision of professors of the Department of Health Education and Health Promotion and was in the form of preparing and sending an educational booklet to students' E-mails that included all the structures of the health belief model using authoritative sources such as Yang' Internet Addiction^[3], Glans' Health Behavior and Health Education^[11], study of Maheri entitled "effect of an educational intervention program based on Health Belief Model on preventive behaviors of Internet addiction"^[5] and study of Amidi Mazaheri entitled "The effect of educational intervention based on Health Belief Model to decrease and prevention of mobile phone addiction among female high school students in Iran"^[12] And also, another part of intervention was preparing and sending ten educational text messages to become more familiar with the factors affecting Internet addiction and its complications. For the questions that the students answers were far from the desired answer in total, the text message related to that question was sent using reliable sources such as Saffari' Health Education & Promotion-Theories, Models & Methods book^[13], Yang' Internet Addiction Book^[3], and Glans' Health Behavior and Health Education Book^[11]. No intervention was performed in the control group. It should be noted that at the end of sending E-mails and text messages, students were asked to send feedback on the content sent by both methods to inform the researcher of the information received (through phone calls and text messages, it was guaranteed that the students received the texts). Two months later, the questionnaires were again given to both groups, and the effects of educational intervention on the Internet addiction status and the promotion of individuals' status in the experimental group were examined in terms of structures of health belief model and compared with the control group.

For descriptive purposes, quantitative variables were presented as mean \pm standard deviation, and qualitative data were reported in terms of proportions. For comparison of the intervention and control groups, convenient parametric and nonparametric analyses such as Chi-square test, Fisher's exact test, Mann-Whitney U-test, and Independent *t*-test were utilized. $P < 0.05$ was considered statistically significant. The effect of intervention on continues outcomes was determined by analysis of covariance and the effect of intervention on binary outcome was determined by logistic regression for repeated measures via GEE approach. $P < 0.05$ was considered statistically significant. Statistical analysis

was performed using SPSS 16 software) SPSS Inc., Chicago, IL, USA).

This study was derived from the master’s thesis with the ethical code IR.SBMU.PHNS.REC.1398.057 approved by Shahid Beheshti University of Medical Sciences, Tehran-Iran. It should be noted that before questioning, students were given the verbal consent and they were informed that the information of the questionnaire was completely confidential.

Results

Table 1 shows the comparison of qualitative demographic characteristics of the two intervention and control groups. In terms of marital status variable, the two intervention and control groups had more single students; in terms of education, the two groups had more undergraduate students; in terms of job variables, the two groups had more unemployed; in terms of the type of use of the Internet, the two groups used the Internet more to receive movies and music; in terms of the variable of Internet use, the two groups used the Internet more in the dormitory; in terms of the variable of Internet use, the highest use was in both intervention and control groups, 3–4 h a day; and in terms of Internet skills, both groups had more basic skills for Internet use. Comparison of the qualitative, demographic variables (job, marital status, level of education, type of Internet use, site of Internet connection, skill of Internet use, and the level of Internet use) states that the Chi-square test for two variables of job ($P = 1$) and marital status ($P = 1$) and Fisher’s test for the two variables of the type of Internet use ($P = 0.73$) and site of Internet use ($P = 0.61$) does not show a significant statistical difference between the two groups of intervention and control. Furthermore, the results of Mann–Whitney test showed that the two groups of intervention and control do not have a significant difference in terms of the variable of skill of Internet use ($P = 0.22$) and the level of Internet use ($P = 0.06$). It should be noted that the results of Mann–Whitney’s test in investigating the variable of education degree between the two groups of intervention and control showed a statistically significant difference ($P = 0.001$) and the effect of degree variable on the whole study [covariance and GEE tests] had been adjusted.

Table 2 shows the comparison of age and grade point average variables quantitative demographic characteristics between the two groups of intervention and control before the educational intervention indicated that there is no significant difference. For age and grade point average variables that did not have normal distribution with Mann–Whitney test, the significant level was $P = 0.06$ and $P = 0.66$, which did not show a significant difference between the two groups for both variables.

Table 1: The comparison of qualitative demographic characteristics of the two intervention and control groups

Variable	Frequency (%)		P<0.05
	Control	Intervention	
Marital status			
Married	8 (6)	8 (6)	1**
Single	126 (94)	126 (94)	
Level of education			
Bachelor	86 (64.2)	110 (82.1)	0.001*
Master	40 (29.9)	23 (17.2)	
PhD	8 (6)	0 (0)	
Job			
Employed	16 (11.9)	16 (11.9)	1**
Non-employed	118 (88.1)	118 (88.1)	
Type of Internet use			
E-mail	6 (4.5)	3 (2.2)	0.73***
News	17 (12.7)	20 (14.9)	
Movies and music	73 (54.5)	74 (55.2)	
Game	2 (1.5)	4 (3)	
Science fictions	36 (26.9)	33 (24.6)	
Site of Internet connection			
Dormitory	130 (97)	128 (95.5)	0.61***
University	3 (2.2)	5 (3.7)	
Internet cafe	1 (7)	0 (0)	
Workplace	0 (0)	1 (7)	
Level of Internet use			
Less than an hour	10 (7.5)	9 (6.7)	0.06*
3-4	61 (45.5)	77 (57.5)	
4-5	32 (23.9)	34 (25.4)	
5-6	14 (10.4)	7 (5.2)	
>6 h	17 (12.7)	7 (5.2)	
Skill of Internet use			
Lack of skills	0 (0)	1 (7)	0.22*
Basic skills	95 (70.9)	102 (76.1)	
Advanced skills	39 (29.1)	31 (23.1)	

*Mann–Whitney test, **Chi-square test, ***Fisher’s test

Table 2: The comparison of quantitative demographic characteristics in the two groups of intervention and control

Variable	Group	Median	Percentile	Percentile	P<0.05
			25	75	
Age	Intervention	21	20	23	0.06*
	Control	22	20	26	
Grade point average	Intervention	17.56	16.5	18.5	0.66*
	Control	17.5	17	18	

*Mann–Whitney test

Table 3 shows the average score of knowledge, perceived susceptibility, perceived severity, perceived benefits, perceived barriers, self-efficacy, and Internet addiction behavior before intervention between intervention and control groups, don’t have a significant difference based on independent *t*-test. The covariance analysis test also showed that the average score of knowledge, perceived susceptibility, perceived severity, perceived barriers, and self-efficacy 2 months after the intervention had a

significant difference with modification of the effect of score before the intervention of each of these variables in the two groups. The significant level for the mentioned variables was $P < 0.001$, $P < 0.001$, $P = 0.006$, $P < 0.001$, and $P = 0.002$, respectively. It should be noted that the score of knowledge, perceived susceptibility, perceived severity, perceived barriers, and self-efficacy of the intervention group after the intervention compared to the control group for each variable was 7.60 units, 4.8 units, 3.74 units, and 5.06 units, and 4.03 units more, respectively. The covariance analysis test showed that the average score of perceived benefits and the average score of Internet addiction behavior 2 months after the intervention did not have a significant difference with the modification of the score effect before the intervention in the two groups and the significant level for these two variables was $P = 0.6$ and $P = 0.11$, respectively. It should be noted that the score of perceived benefits of the intervention group after the intervention was 0.69 units higher than that of the control group. In fact, educational intervention has a positive effect on increasing the average score of perceived benefits in the intervention group, but statistically, this value was not significant. Regarding the behavior of Internet addiction, the averages show that educational intervention had reduced the Internet addiction behavior by 3 units in the intervention group, but statistically, this rate was not significant due to the large standard deviation.

Table 4 shows that the frequency of Internet addiction does not have a significant difference between the intervention and control group before the intervention based on the Chi-square test ($P = 0.41$). Also, the logistics regression test with the GEE approach showed that the frequency of Internet addiction between the intervention and control group did not have a significant difference after the intervention ($P = 0.63$). It is worth noting that the percentages show that educational intervention has had a positive effect on reducing the frequency of Internet addiction and it has reduced it.

Discussion

The results of the present study showed that educational intervention promoted significantly the average scores of knowledge and a number of structures of health belief model (perceived susceptibility, perceived severity, perceived barriers, and self-efficacy) by modifying the score effect before intervention of any of these variables in two groups. The findings of this study regarding the mentioned variables were consistent with the findings of the studies conducted by Maheri *et al.*,^[5] Soheylizad, *et al.*,^[14] Amidi Mazaheri,^[12] and Khazae-Pool *et al.*^[15] regarding these structures. Similar studies and other studies in this field include the study conducted by Solhi *et al.*,^[16] Panahi *et al.*,^[17] Rahnavard *et al.*,^[18] Setoudeh *et al.*,^[19] and Rakhshani *et al.*^[20] It is worth noting that the results of the present study

Table 3: Comparison of the average score of structures of health belief model and Internet addiction behavior before and 2 months after the educational intervention

Variable	Time	Mean±SD		P<0.05
		Control	Intervention	
Knowledge	Before	76.54±14.40	75.10±16.42	0.79*
	2 months after	84.16±14.89	75.95±16.39	<0.001**
Perceived susceptibility	Before	71.28±15.08	73.19±15.84	0.35*
	2 months after	78.83±9.34	74.77±15.53	<0.001**
Perceived severity	Before	78.38±14.84	79.27±12.70	0.93*
	2 months after	83.30±9.91	79.90±13.90	0.006**
Perceived benefits	Before	84.59±12.80	85.34±13.13	0.57*
	2 months after	85.85±11.09	85.40±12.62	0.60**
Perceived barriers	Before	70.93±13.32	71.11±14.74	0.62*
	2 months after	78.39±10.59	73.39±13.80	<0.001**
Self-efficacy	Before	72.78±14.53	74.30±15.83	0.30*
	2 months after	78.90±8.94	75.52±14.92	0.002**
Internet addiction behavior	Before	35.73±13.28	33.92±14.12	0.22*
	2 months after	32.73±11.64	33.70±13.21	0.11**

*Independent t-test, **Analysis of covariance

Table 4: Comparison of the frequency of Internet addiction between groups before and 2 months after the educational intervention

Variable	Time	Intervention		Control		P<0.05
		Routine user	Addict user	Routine user	Addict user	
Frequency of Internet addiction	Before	81.3 (109)	18.7 (25)	85.1 (114)	14.9 (20)	0.41*
	2 months after	95.5 (128)	4.5 (6)	88.8 (119)	11.2 (15)	0.63**

*Chi-square, **Logistic regression with repetitive measures with GEE (Generalized estimating equation)

on the variable of perceived benefits are inconsistent with the above studies because in these studies after the educational intervention, the average score of the variable of perceived benefits of the intervention group was significantly different compared to the control group. In general, in the present study, the educational intervention has had a positive effect on increasing the average score of perceived benefits in the intervention group, but statistically, this value is not significant, which can be for these reasons: (a) being exposed to education and media advertising, (b) lack of sufficient opportunity for accurate training in relation to perceived benefits, (c) intangibility of the complications of Internet addiction and consequently lack of understanding of the benefits of controlled use from the Internet by students, and (d) design and implementation of educational intervention indirectly (E-mail and SMS) instead of using direct and face-to-face methods. Although the average score of Internet addiction behavior has been decreased after educational intervention by 3 units, no statistically significant difference was observed due to the large standard deviation. This finding is inconsistent with the result of post educational intervention in control and intervention groups in terms of average Internet addiction behavior score in the study conducted by Maheri *et al.*,^[5] average score of the behavior of using mobile phone in the study conducted by Soheylizad *et al.* research,^[14] average score of mobile phone addiction behavior in the study conducted by Amidi Mazaheri,^[12] and average score of addictive behavior of smoking in the study conducted by Khazae-Pool *et al.*^[15] In fact, in each of the mentioned studies, there was a significant difference between the control group and the intervention group in terms of the average score of the behaviors discussed after the intervention. In addition, the findings in terms of the frequency of Internet addiction were not consistent with the finding of the study conducted by Maheri *et al.*,^[5] in which Internet addiction frequency was significantly different after the intervention between the intervention and control groups. It is worth mentioning here that the educational intervention has reduced Internet addiction. Reasons for insignificance of the average score of Internet addiction behavior and its frequency can be the nature of the student population who are forced to use the Internet too much to do scientific work and academic research, the coincidence of posttest time with the end-of-term activities of students which has led to more use of the Internet to complete student projects, inaccuracy in responding due to lack of time, and indirect educational method in the form of E-mail and text message. In general, the researcher had some limitations in this research due to the indirect method of intervention (lack of feedback by the target group, not spending enough time and accuracy to study the content and difficulty in conveying the concepts desired by the

researcher as intended), and problem of underestimate self-report of Internet addiction in students with this addiction, lack of students' awareness to understand the seriousness of the problems created by addictive use of the Internet, the unreliability of the effects of Internet addiction prevention training over time in students due to the non-repetition of the subject over time, and etc.

Conclusions

The results of this study show the effectiveness of designing educational intervention based on the structures of health belief model in reducing Internet addiction behavior and adopting preventive behaviors.

The results also showed that compiling educational content in accordance with the study objectives and scientific principles of health education and using appropriate educational methods based on audience conditions (limited student time, lack of knowledgeable educators) were successful in promoting health-related outcomes such as Internet addiction status. The study participants and their families, the officials of the Department of Education and Student Affairs of universities, and officials and managers at all levels of management are the main groups that could use the study findings. To solve the problem of insignificance of perceived benefits after intervention in the intervention and control groups, it is suggested to use the effective executive methods in educational programs such as showing movies that involve the person with the problem and the duration of the executing educational program and repetition to be increased at regular intervals and other educational methods to be used, including direct and face-to-face methods. Also, to solve the problem of insignificance of average score of Internet addiction behavior and its frequency after the intervention, this study should be conducted on other strata that have less contact with the Internet as a target group other than the student stratum and direct and face-to-face educational methods should be used with a high number of educational sessions. In general, repetition of trainings at regular intervals and their continuity can lead to the reliability of the effects created after the intervention.

Acknowledgments

The authors thank and appreciate all those involved in this study, including the students who participated in the study, the officials of the Faculty of Health and Safety, and the officials of Somayeh and Hazrat Zeinab (PBUH)'s dormitories.

Financial support and sponsorship

This study was financially supported by Shahid Beheshti University of Medical Sciences in Iran.

Conflicts of interest

There are no conflicts of interest.

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