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# The relationship between the internet addiction and cell phone addiction with academic burnout in medical students of Mashhad University of Medical Sciences

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## Abstract

**Introduction:** Academic burnout in students can be caused by various reasons such as family distance, inability to communicate properly with other peers, and the large volume of courses that hurt academic performance, and achievement. This study investigated the relationship between cell phone addiction and internet addiction, with academic burnout in medical students of Mashhad University of Medical Sciences.

**Materials and Methods:** This was a cross-sectional (descriptive-analytical) study performed on medical students of Mashhad University of Medical Sciences in 2020. One-hundred and ninety-nine students in basic sciences, physiopathology, internship, and externship were selected by the simple random method. Research instruments included the Kimberly Young Internet Addiction Test (IAT), the Koohy Mobile Phone Addiction Index (MPAI), and the Maslach Burnout Inventory (MBI). The data were analyzed by the descriptive statistics tests, independent t-test, one-way analysis of variance, Bonferroni post hoc test, multiple linear regression, and SPSS-25 software.

**Results:** The mean score of internet addiction in internship students is lower than in other courses ( $P < 0.001$ ). Also, the mean score of cell phone addiction in female students was higher than male students. However, the mean score of total burnout was not different based on gender, marital status, educational level, and residence status ( $P > 0.05$ ). Also, the linear regression results showed that internet use could increase academic burnout in students ( $P < 0.001$ ). However, cell phone addiction did not affect academic burnout ( $P > 0.05$ ).

**Conclusion:** Internet addiction can increase the risk of academic burnout in students. However, cell phone use does not increase this risk.

**Keywords:** Academic burnout, Cell phone addiction, Internet addiction

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## Introduction

Burnout is an individual's response to prolonged stress conditions in a given organizational setting (1). Good mental health and the absence of burnout are necessary for developing and maintaining students and medical professionalism (2). The main causes of burnout include high workload, lack of control, lack of rewards, lack of social relations, value conflict, and injustice, which are obvious signs of incompatibility between person and job. Burnout studies focus mainly on professions that help others or people whose work requires close interaction with others (such as health care, education, and social work). Burnout is a syndrome of emotional exhaustion, personality decline, and decreased personal success (3). Burnout can lead to psychological distress, such as anxiety, depression, frustration, hostility, or fear (4). Previous research has shown that burnout can lead to less commitment, more turnover, absenteeism, reduced productivity, low morale, and less human attention (3).

One of the issues that medical students have considered in the digital age is the use of smartphones and the internet, which, if not used properly, can lead to dependence or even addiction (5). Internet addiction is one of the newest types of addiction that has interested researchers, especially in recent years (6). Various studies show that internet addiction can increase the risk of Attention Deficit Hyperactivity Disorder (ADHD), depression, anxiety, substance use disorders, and personality disorders (6). Other studies have confirmed the occurrence of insomnia and psychosomatic symptoms such as headache and dizziness in people with internet addiction (7).

Cell phone addiction is also a type of addiction caused by excessive use of cell phone with a special motivation that leads to mental, physical, behavioral, and social disorders. Cell phone addiction has become an important factor in students' mental health and daily life (8). Excessive cell phone use can also cause unpleasant symptoms such as dizziness, persistent headaches, damage to the retina and eardrum, inattention, memory impairment, and a feeling of constant tiredness. Li et al. in a study on 739 medical students found that students who were overly dependent on cell phones had varying degrees of physical dysfunction due to long-term use,

such as finger injuries and neck spondylitis. In addition, according to the survey, the overall quality of youth sleep has declined from year to year in recent decades (9). Since fewer studies have been conducted on internet and smartphone addiction and their relationship with medical students' burnout, this study aims to investigate the relationship between the internet and cell phone addiction and medical students' burnout at Mashhad University of Medical Sciences.

## Materials and Methods

This study was a cross-sectional (descriptive-analytical) study conducted in 2020 on medical students of Mashhad University of Medical Sciences. The sample size was calculated using the Ayati et al. study (10). The sampling method was simple random.

Inclusion criteria included fulfilling the informed consent form, internet and cell phone access, not having depressive disorder, anxiety disorders, or substance abuse during research, and not having incurable diseases or other diseases which were examined by participants' records and self-report checklists. Exclusion criteria included unwillingness to continue research and incomplete questionnaires. The student number of all students in each section was recorded in a separate sheet in Excel 2013. Then, with this software, the number of students was determined based on each educational level and randomly selected (53 students of basic sciences, 36 of physiopathology, 53 of externship, and 48 of internship). The ethical considerations of this study were the confidentiality of information and participants' responses, as well as obtaining informed consent to participate in the study. Due to the coronavirus pandemic, the website for making and fulfilling an online questionnaire ([www.porsline.ir](http://www.porsline.ir)) was used to perform interventions and collect data. The students' telephone numbers were taken from the faculty while maintaining fiduciary duty. An online questionnaire link was sent to students on WhatsApp. Before fulfilling the questionnaires, the necessary explanations were given about the optionality of completing the questionnaire and keeping the information and objectives of the study confidential. If any participants did not want to participate in the study, again using the student numbers available in Excel 2013, another student number was randomly selected and continued until the desired sample size was reached.

### Research instruments

A) *Mobile Phone Addiction Index (MPAI)*: This questionnaire was designed in 2009 by Koochy. This questionnaire has 20 questions with a 5-point Likert scale (never= 1, rarely= 2, sometimes= 3, often= 4, and always= 5). The total score is between 20 and 100, with a higher score indicating greater dependence on cell phone. Its validity and reliability were confirmed in the original version with a Cronbach's alpha coefficient of 0.92. Also, in Morvati et al. study on 70 students of Zanjan University in 2019, Cronbach's alpha was confirmed by 0.83 (11).

B) *Internet Addiction Test (IAT)*: This test was designed by Young and it has been widely used to screen whether users are addicted to the internet and the severity of their addiction. The IAT consists of 20 items rated on a 5-point scale ranging from 1 (very rarely) to 5 (very frequently). The total score ranges from 20 to 100. The higher scores indicate more severe internet addiction. The internal consistency for the IAT was good in the current sample ( $\alpha= 0.928$ ) (12). The validity and reliability of the questionnaire in a study by Alavi et al. on 400 students of Isfahan University was confirmed by Cronbach's alpha of 0.70 (13).

C) *Maslach Burnout Inventory (MBI)*: The Maslach Burnout Inventory–Student Survey (Schaufeli, et al., 2002) includes three subscales: exhaustion was measured with five items (e.g., "I feel emotionally drained by my studies"), cynicism was measured with four items (e.g., "I have become more cynical about the potential usefulness of my studies"), and academic inefficacy was measured with six items (e.g., "In my opinion, I am a good student"). All items were scored on a 7-point frequency rating scale ranging from 0: never to 6: always. High scores on emotional exhaustion and cynicism and low scores on academic efficacy indicate burnout (academic inefficacy items are scored reversely). Its

validity and reliability in the original version were obtained with Cronbach's alpha coefficient of 0.70, 0.82, and 0.75 for exhaustion, cynicism, and academic inefficacy, respectively. The validity and reliability of this questionnaire in a study by Rostami et al. in 2011 on 238 female students of the Isfahan University, was approved with Cronbach's alpha of 0.89, 0.84%, 0.67 in the above subscales, respectively (14).

After collecting the questionnaires, the data were analyzed by the descriptive statistics tests, independent t-test, one-way analysis of variance, Bonferroni post hoc test, multiple linear regression, and SPSS-25 software.

### Results

In this study, 190 students participated. The mean age of the participants was 22.2 years. The demographic variables were presented in Table 1. Independent t-tests and one-way analysis of variance were used to compare the mean scores of internet and cell phone addiction. According to the results, there was no significant difference between the mean score of internet addiction in men and women ( $P= 0.571$ ). In addition, there was no statistically significant difference between the mean score of internet addiction and marital status and residence status in student dormitories ( $P= 0.493$ ,  $P= 0.964$ ). However, the mean score of internet addiction in terms of degree was statistically significant ( $P< 0.001$ ). According to the results of the Bonferroni post hoc test, the mean score of internet addiction in internship students was significantly lower than the other three groups ( $P= 0.001$ ).

To compare the mean score of cell phone addiction between two genders, it was found that it was higher in women than men ( $P= 0.031$ ). However, there were no significant differences in cell phone addiction scores in terms of marital status, educational level, and residence ( $P> 0.05$ ) (Table 1).

**Table 1.** Comparison the internet and cell phone addiction in terms of demographic variables

| Demographic variables |                 | N   | %     | Internet addiction |        | Cell phone addiction |       |
|-----------------------|-----------------|-----|-------|--------------------|--------|----------------------|-------|
|                       |                 |     |       | Mean $\pm$ SD      | P*     | Mean $\pm$ SD        | P*    |
| Gender                | Male            | 94  | 49.47 | 55.28 $\pm$ 10.25  | 0.571  | 45.60 $\pm$ 6.30     | 0.031 |
|                       | Female          | 96  | 50.53 | 56.12 $\pm$ 10.07  |        | 47.63 $\pm$ 6.12     |       |
| Marital status        | Single          | 161 | 84.8  | 55.92 $\pm$ 10.01  | 0.493  | 46.93 $\pm$ 6.28     | 0.174 |
|                       | Married         | 29  | 15.2  | 54.51 $\pm$ 10.95  |        | 45.20 $\pm$ 6.09     |       |
| Educational level     | Basic sciences  | 53  | 27.9  | 57.54 $\pm$ 7.07   | <0.001 | 46.62 $\pm$ 5.65     | 0.282 |
|                       | Physiopathology | 36  | 19    | 58.36 $\pm$ 8.85   |        | 47.25 $\pm$ 5.23     |       |

|                    |  |     |      |             |       |            |       |
|--------------------|--|-----|------|-------------|-------|------------|-------|
|                    | Externship                             | 53  | 27.9 | 58.88±7.36  |       | 47.58±6.24 |       |
|                    | Internship                             | 48  | 25.2 | 48.18±12.71 |       | 45.27±7.50 |       |
|                    | Native                                 | 112 | 59   | 55.64±9.34  |       | 46.28±5.51 |       |
| Residential status | Non-native non-dormitory               | 42  | 22.1 | 56.07±11.27 | 0.964 | 47.07±7.54 | 0.590 |
|                    | A non-native resident of the dormitory | 36  | 18.9 | 55.50±11.38 |       | 47.38±6.93 |       |

\* Independent t-test and one-way analysis of variance

In comparing the mean score of burnout and its dimensions according to the demographic variables, it was found that there is a significant difference between the mean score of total burnout between educational levels ( $P= 0.012$ ). The Bonferroni post hoc test results showed that internship students have less burnout than basic science and externship students ( $P= 0.020$ ) ( $P= 0.029$ ). However, there were no significant differences in

burnout scores in term of gender, marital status, and residence status ( $P> 0.05$ ). However, in the burnout score among the subgroups of academic burnout, except for the exhaustion dimension, which was significantly higher in married students than single students ( $P= 0.047$ ) in other subgroups, no statistically significant differences were observed in the demographic variables ( $P> 0.05$ ) (Table 2).

**Table 2.** Comparison of academic burnout and its dimensions based on demographic variables

| Demographic variables |  | Exhaustion |       | Cynicism  |       | Academic inefficacy |       |
|-----------------------|--|------------|-------|-----------|-------|---------------------|-------|
|                       |  | Mean ± SD  | P*    | Mean ± SD | P*    | Mean ± SD           | P*    |
| Gender                | Male                                   | 20.84±6.34 | 0.868 | 5.50±2.85 | 0.488 | 16.82±4.38          | 0.818 |
|                       | Female                                 | 20.68±6.29 |       | 5.79±2.93 |       | 16.66±5.32          |       |
| Marital status        | Single                                 | 20.37±6.13 | 0.047 | 5.65±2.84 | 0.902 | 16.76±4.88          | 0.912 |
|                       | Married                                | 22.89±6.88 |       | 5.58±3.17 |       | 16.65±4.89          |       |
| Educational level     | Basic sciences                         | 21.09±4.99 | 0.151 | 6.20±2.99 | 0.167 | 17.75±4.24          | 0.081 |
|                       | Physiopathology                        | 21.00±5.66 |       | 5.47±2.73 |       | 16.50±4.19          |       |
|                       | Externship                             | 21.83±6.16 |       | 5.83±2.63 |       | 17.16±5.38          |       |
|                       | Internship                             | 19.04±7.85 |       | 4.95±3.08 |       | 15.35±5.18          |       |
| Residential status    | Native                                 | 21.21±5.96 | 0.188 | 5.66±2.88 | 0.660 | 43.17±9.17          | 0.364 |
|                       | Non-native Non-dormitory               | 20.64±6.68 |       | 5.90±2.93 |       | 43.14±10.46         |       |
|                       | A non-native resident of the dormitory | 19.50±6.85 |       | 5.30±2.90 |       | 43.17±9.17          |       |

In statistical analysis, the prediction of the internet addiction score was adjusted by adjusting the effect of other variables by a multiple linear regression test. The results showed that the score on internet addiction in the group of internship students increased by an average of 6.46 points compared to the students of basic sciences. However, the mean

score of internet addiction in other subgroups was not significantly different ( $P> 0.05$ ). The test to predict the cell phone addiction score showed that internship students had a higher average score of 4.08 than basic science students. Nevertheless, this value was not significant differences in other subgroups ( $P> 0.05$ ) (Table 3).

**Table 3.** Multiple linear regression test to predict internet addiction and cell phone addiction

| Variables         | Internet addiction      |         | Cell phone addiction   |         |
|-------------------|-------------------------|---------|------------------------|---------|
|                   | Total                   | P       | Total                  | P       |
| Fixed coefficient | 85.03<br>(65.75,104.49) | < 0.001 | 62.41<br>(49.99,75.73) | < 0.001 |
| Age               | -1.46<br>(-2.46,-0.46)  | 0.004   | -0.74<br>(-1.42,0.06)  | 0.032   |
| Male              | -0.13<br>(-2.75,2.48)   | 0.918   | -1.55<br>(-3.36,0.19)  | 0.080   |
| Married           | 0.33<br>(-3.42,4.13)    | 0.864   | -1.31<br>(-3.84,1.25)  | 0.314   |

|                    |                                       |                       |       |                      |       |
|--------------------|---------------------------------------|-----------------------|-------|----------------------|-------|
| Educational level  | Physiopathology                       | 3.67<br>(-0.68,8.02)  | 0.098 | 2.33<br>(-0.61,5.29) | 0.120 |
|                    | Externship                            | 6.46<br>(-0.68,8.02)  | 0.012 | 4.08<br>(-0.68,7.47) | 0.019 |
|                    | Internship                            | -0.78<br>(-7.90,6.32) | 0.827 | 4.08<br>(-0.68,7.47) | 0.142 |
| Residential status | Non-native non-dormitory              | 3.46<br>(-0.29,6.52)  | 0.067 | 1.63<br>(-0.65,3.92) | 0.160 |
|                    | Non-native residents of the dormitory | 0.11<br>(-3.44,3.67)  | 0.948 | 1.31<br>(-1.09,3.73) | 0.218 |

Also, to predict the burnout score and its dimensions by modulating the effect of other variables, this test showed that none of the studied variables predicts the mean score of students' burnout. In the subgroup of dimensions of burnout, none of the variables

could predict the mean score of burnout, except in the dimension of exhaustion, where the mean score of burnout in married students was 2.81 points higher than single students ( $P= 0.026$ ) (Table 4).

**Table 4.** Multiple linear regression to predict academic burnout score and its dimensions by adjusting the effect of other variables

| Variables         | Total burnout           | P     | Exhaustion              | P     | Cynicism              | P     | Academic inefficacy    | P     |
|-------------------|-------------------------|-------|-------------------------|-------|-----------------------|-------|------------------------|-------|
| Fixed coefficient | 12.61<br>(-12.08,30.37) | 0.001 | -0.35<br>(-16.60,15.88) | 0.996 | -0.18<br>(-8.09,7.71) | 0.963 | 13.15<br>(-0.08,26.39) | 0.051 |
| Age               | 0.391<br>(-0.62,1.40)   | 0.447 | 0.25<br>(-1.60,1.81)    | 0.457 | 0.18<br>(-0.14,0.50)  | 0.271 | -0.04<br>(-0.58,0.50)  | 0.879 |
| Male              | 0.08<br>(-2.52,2.68)    | 0.951 | 0.10<br>(-1.60,1.81)    | 0.904 | -0.31<br>(-1.15,0.51) | 0.452 | 0.29<br>(-1.10,1.68)   | 0.678 |
| Married           | 3.17<br>(0.578,6.92)    | 0.097 | 2.81<br>(0.34,5.27)     | 0.026 | 0.12<br>(-1.07,1.32)  | 0.836 | 0.236<br>(-1.77,2.24)  | 0.817 |
| Physiopathology   | -3.71<br>(-8.04,0.61)   | 0.092 | -1.33<br>(-4.17,1.51)   | 0.357 | -1.15<br>(-2.53,0.23) | 0.102 | -1.23<br>(-3.55,1.08)  | 0.296 |
| Externship        | -3.16<br>(-8.20,1.88)   | 0.218 | -1.38<br>(-4.65,1.98)   | 0.427 | -1.16<br>(-2.77,0.45) | 0.157 | -0.65<br>(3.36,2.04)   | 0.632 |
| Internship        | -5.72<br>(-12.75,1.32)  | 0.111 | -2.16<br>(-6.79,2.46)   | 0.358 | -1.86<br>(-4.11,0.39) | 0.105 | -1.69<br>(-5.46,2.08)  | 0.377 |
| Non-dormitory     | 0.49<br>(2.86,3.84)     | 0.773 | -0.90<br>(-3.10,1.30)   | 0.420 | 0.07<br>(-1.00,1.14)  | 0.894 | 1.32<br>(-0.47,3.11)   | 0.149 |
| Dormitory         | -2.82<br>(-6.33,0.68)   | 0.114 | -1.45<br>(-3.75,0.85)   | 0.217 | -0.50<br>(-1.62,0.62) | 0.381 | -0.87<br>(-2.75,1.00)  | 0.359 |

Finally, in analyzing the multiple linear regression test results, internet addiction and cell phone addiction can predict academic burnout score and its dimensions by adjusting the effect of other confounding variables.

Internet addiction score significantly increases the total burnout score and exhaustion, cynicism, and academic inefficacy by 0.39, 0.24, 0.06, and 0.08, respectively (Table 5).

**Table 5.** Internet and cell phone addiction score to predict burnout score and its dimensions

| Variable             | Total burnout          | P      | Exhaustion           | P      | Cynicism              | P     | Academic inefficacy   | P     |
|----------------------|------------------------|--------|----------------------|--------|-----------------------|-------|-----------------------|-------|
| Internet addiction   | 0.39<br>(0.23,0.54)    | <0.001 | 0.24<br>(0.13,0.34)  | <0.001 | 0.06<br>(0.01,0.11)   | 0.008 | 0.08<br>(0.03,0.16)   | 0.042 |
| Cell phone addiction | -0.004<br>(-0.23,0.22) | 0.971  | 0.01<br>(-0.13,0.16) | 0.883  | -0.01<br>(-0.09,0.05) | 0.640 | 0.002<br>(-0.11,0.12) | 0.975 |

**Discussion**

Medical students may be more likely than other students to burn out due to long study times, uncertain job prospects, and successive shifts. This study aimed to investigate the

relationship between cell phone addiction, internet addiction, and academic burnout in medical students of Mashhad University of Medical Sciences in 2020. Our study showed that 77% of students are exposed to internet

addiction, but none of them are addicted to the internet. Zhang et al. conducted a meta-analysis study in 2018 in Singapore on ten articles. The data of 3651 students entered the study. The research instrument was Chen's Internet Addiction Scale (CIAS). The prevalence of internet addiction was estimated at 30.1%, which is higher than our study (15). In a study by Salehi et al. in 2013 among students of Mashhad University of Medical Sciences, 383 medical students participated. Among them, 355 (92.7%) were not addicted to the internet, 8 (2.1%) were exposed to internet addiction, and 20 (5.22%) students were addicted to the internet (16). Fatehi et al. conducted a study on 174 medical students of Tehran University of Medical Sciences through the internet addiction questionnaire. The results showed that 146 students (83.9%) were not addicted to internet, and 28 students (16.1%) received a score above 50 and were exposed to internet addiction (17). These studies mostly focused on the level of internet addiction among the participants, and there was no report regarding the level of burnout caused by it. Our results showed a significant relationship between internet use and students' burnout. These results are consistent with the Imani study conducted on 255 students in the School of Health Information Management and Medical Informatics of Tabriz University of Medical Sciences. They reported that there is a significant difference between internet addiction and academic burnout. These results are consistent with our study. However, in the results of their study, there was no significant relationship between internet addiction and gender, which is not consistent with our study (18).

This study showed that almost all students (98.9%) have moderate use of cell phone, and only one student was addicted to cell phone. In the Yahya Zadeh study on 150 nursing students of Tehran University of Medical Sciences, 9.30% of the participants were addicted to internet (19). However, in a study by Mosalanejad et al. conducted on 233 students of Jahrom University of Medical Sciences, 97.8% of the participants reported cell phone addiction (20). In a review article which published by Pedrero-Pérez et al. in 2012, the prevalence of cell phone addiction was reported from 0 to 38%, depending on the scale used and the characteristics of the study population (21). In a study conducted by

Alhazmi et al. in 2017 at King Abdul Aziz University in Jeddah, Saudi Arabia, 36.5% of the 181 students who participated in the study were addicted to cell phone (22).

Also, our results showed no significant difference between cell phone addiction and academic burnout. These results are not in line with the Noruzi Kuhdasht et al. study in 2017, which was performed on 169 nursing and midwifery students of Zahedan University of Medical Sciences. They reported a correlation coefficient between cell phone addiction and burnout (23). Also, the results of our study are not consistent with the results of the study by Azizi et al. in 2018, which was conducted on 360 students of Kermanshah University of Medical Sciences. They concluded a negative and significant correlation between social networking addiction and academic performance (24).

One of the limitations of this study is that it is cross-sectional and cannot calculate the causal relationship accurately. Another limitation of the present study is its implementation during the Corona pandemic and self-reporting tools that do not allow accurate estimation. Other limitations include taking samples from one university. In contrast, students in all universities in Mashhad city use cell phones and the internet, so it is not possible to generalize these results to medical students at other universities. Another limitation of this study is the lack of study of other factors, such as substance abuse, or having anxiety, depression, etc., which may play a significant role in internet and cell phone addiction and academic burnout.

### **Conclusion**

The results of this study indicate that there is academic burnout in medical students, and students who use the internet more are more prone to burnout. Medical students experience more burnout during the internship, and exhaustion, one of the dimensions of burnout, was higher in married people than single ones. Internet addiction was also significantly associated with the risk of academic burnout. Since other factors affecting students' academic burnout have not been evaluated in this study, it is recommended to conduct studies to determine other factors affecting it.

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