Research Article

Surveying the relationship of Internet addiction with dependence on cell phone, depression, anxiety, and stress in collegians
(Case study: Bam University of Medical Sciences)

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ABSTRACT

Background and objectives: A considerable increase in using the Internet and cell phone is evident especially among university students. On the other hand, the attention and concerns expressed about the psychological and social effects of long-term use of communicational technologies and the, probably negative, effects on professional future and social relationships are growing. Therefore, the present study is aimed at determining the relationship of Internet addiction with excessive dependence on cell phone, depression, anxiety, and stress in the students of Bam University of Medical Sciences.

Methodology: A comparative-correlative study on 230 students in Bam University of Medical Sciences was carried out in 2014. The data was collected using Young’s Internet Addiction Test (IAT), dependence of cell phone, and Lovibond & Lovibond’s depression, anxiety and stress scale (DASS-21). (sig. = 0.05)

Finding: Total scores of Internet addiction and dependence on cell phone were 49.03±20 and 42.7±11.77 respectively. There was also a significant relationship between Internet addiction and the variables dependence on cell phone, depression, anxiety, and stress. (p<0.05)

Conclusion: The results showed that increase in the time spent on the Internet led to increase in depression, anxiety, stress, and dependence on cell phone. Therefore, there is a need for more efficient educational, consultation, and behavioral planning to attenuate the psychological and social damages.

Keywords: Internet addiction, dependence on cell phone, depression, anxiety, stress, students

INTRODUCTION

Access to the Internet is one of the signs of modern world, which is also a growing phenomenon and the number of Internet users is growing day by day [1]. By the end of March 2011, there were more than two billion Internet users all around the world [2]. Number of Internet users in Iran in 2006 was 11 million and this figure reached to 33 million and 200 thousand by
2010, so that Iran is in top of the list in the Middle East regarding the number of Internet users. [3]
Nowadays, Internet is an indispensable part of daily lives of students so that they use it for doing educational and non-educational activities. Although, this technology is a positive change in the communication field and a critical requirement of the modern life, excessive use of the Internet can lead to Internet addiction disorder (IAD). Given their age range and nature of their activities, university students are at high risk of developing Internet addiction [4]. Alavi showed that 39% of university students were severely addicted to the Internet [5]. Bahri reported that 9.5% of the students suffered from IAD and 21.5 were at high risk. [4] Regardless of it categorization as disease, psychological damage, or a social problem, Internet addiction or behavioral dependence on the Internet is a chronic, epidemic, recurrent phenomenon with serious physical, economic, social, familial, and psychological damages [6]. To use the Internet, people have to cut the valuable time they could spend with their family and friends, which leads to formation of smaller social groups, higher levels of seclusion, and development of the stress and depression symptoms. [7] Along with the Internet, we witness development of other technologies such as cell phones [8]. They are taking more colorful roles in our lives so that people can access to almost all Internet services through their phone. [9]
Students that suffer from IAD, use their cell phone to access the Internet, which in turn makes them more depended on their cell phone. [10]
Students that spend long hours using their cell phone develop dependence on their phone, which can lead to the damages caused by excessive use of cell phone. In addition, such behavior may cause educational, economic, cultural, and social problems and changes. These problems may lead to depression, stress, and anxiety. [11]
Studies have supported the role of excessive use of the Internet and cell phone on psychological issues such as depression and stress in students. Ehmat and Skandar (2011) argued in their study that IAD was directly effective on depression, anxiety, and stress in the students [12]. Hong and Lien showed that IAD was significantly related to depression and social anxiety in students [13]. In another study, Lashkarara et al. [2012] surveyed general health of the students with IAD and concluded that these students had higher risk of depression and anxiety comparing with the students without IAD. [14] Toumi et al. (2007) showed that using the Internet and cell phone for long hours led to increase in the risk of stress and depression [15]. Manteghi (2007) showed that excessive use of the Internet and cell phone led to higher risk of depression and stress [15]. Manteghi (2007) reported that excessive use of the Internet and cell phone resulted in more resistive symptoms of stress and depression in return. [16] Taking into account expansion of access to the Internet and cell phone, among university students in particular, given the ever increasing importance of using the technology, that depression in the student influences their professional future and social communication negatively, and having in mind paucity of studies on internet addiction, dependence on cell phone, and the psychological problems rooted in excessive use of these technologies, the present study is an attempt to determine the relationship of Internet addiction with dependence on cell phone, depression, anxiety, and stress in students.

**MATERIALS AND METHODS**

A cross-sectional study of descriptive-analytical was carried out. Study population included all the students at Bam University of Medical Sciences (n = 641) in academic year 2014-15. At first, number of participants from each field was determined based on the study population size and sample size. Then, the participants were selected through systematic random method based on students’ roster and cluster gap. The inclusion criteria were: having passed at least one semester in the university, enrollment in the current
semester, expressing consent to participant in the study, and no psychological disorder
Following Pirzad (2011), “P”, “Z”, and “d” were equal with 91.7, 1.96, and 0.03 respectively [17]; and the sample size was obtained based on Cochran’s formula equal with 216. Considering probable leaves, 230 participants were selected. Having secured the required permissions and licenses from the authorities, the participants were introduced to the study through a meeting in the university. Then the participants were provided with the questionnaires after expressing their consent. The questionnaires were filled out in presence of the researcher so the participants could ask any question about the questionnaires.

**Demographics questionnaire**
The questionnaire collects information about age, gender, marital status, field of study, program, semester, and occasions of using cell phones, average time of using cell phone and the Internet (min/day), and average time spent on social networks. To measure Internet addiction, a Farsi version of Young’s IAT, as one of the most creditable tests in this field, was used. The questionnaire included 20 statements designed based on Likert’s five-point scale (never = 1, rarely = 2, sometimes = 3, usually = 4, always = 5). The obtained scores (0 – 100) were interpreted based on the standard of the questionnaire and previous studies (20 – 49: normal, 50-79: trivial dependence/ at risk; 80-100: sever dependence/ addicted).

Validity and reliability of the questionnaire have been supported by several studies. Cronbach’s alpha of the questionnaire in Sweden and S Korea were obtained 95% and 90% respectively; therefore, reliability of the questionnaire is acceptable [18]. Alavi et al. used the Farsi version of IAT and reported its content/discriminated validity (r = 0.5), retest reliability (r = 0.79), internal consistency (α = 0.88). [5]

In addition, Dargahi& Razavi reported reliability of the questionnaire for Iranian population equal with 0.88. [19]

Cell phone addition scale is comprised of 20 statements in three subscales of coping deprivation (statements No.1 – 7), life routine disruption (statements No. 8 – 13), and compulsion – insistence (statements No. 14-20). The statements are designed based on Likert’s five-point scale (no=1, very low=2, low=3, high=4, very high=5). Total score of each subscale and total score (20-100) of the whole questionnaire are considered as total score of dependence on cell phone. Therefore, scores >70 is interpreted as severe addiction, 63-70 as excessive use, and score < 63 as moderate usage. Khazaie et al. obtained Cronbach’s alpha of the questionnaire equal with 0.92. [20]

**DASS-21:** The scale was developed by Lovibond & Lovibone in 1995; it is comprised of three self-report scales to measure negative emotions of depression, anxiety, and stress. Each subscale is comprised of 7 statements and final score of each subscale is the total obtained score in that subscale. DASS-21 is a short form of the original scale with 42 statements; therefore, the obtained score in each subscale must be multiplied by two. Antony et al. (1998) obtained Cronbach’s alpha of the subscales equal with 0.97, 0.92, and 0.95. Validity and reliability of the questionnaire for Iranian population were examined by Samani and Jokar (2007); retest reliability of depression, anxiety, and stress subscales were obtained 0.80, 0.76, and .0.77 respectively; and Cronbach’s alphas for depression, anxiety, and stress were obtained 0.81, 0.74, and 0.78 respectively. [21]

The collected data was encoded and analyzed in SPSS (16) using descriptive statistics (percentages, ratio, mean, standard deviation) and analytical tests were used to examine the relation between Internet addiction and demographical specification, dependence on cell phone, depression, anxiety, and stress (Pearson’s correlation and Chi Square).

**FINDINGS**
Total number of the participants was 229 with average age of 21.7±2.6. Total score of Internet addiction was 49.03±2. There was a significant
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relationship between mean score of Internet addiction and some of the demographical variables such as age, average time of using the Internet and cell phone (Table 2). Variance analysis showed significant difference between mean score of Internet addiction based on the semester enrolled by the students (p-value = 0.003). Moreover, there was no significant difference between gender and marital status based on the t-test results showed. (Table 3)

Mean score of dependence on cell phone was 42.7±11.7 and t-test result showed that there was a significant difference between married and unmarried students with regard to dependence on cell phone. In addition, mean score of dependence on cell phone in married students (47.6) was significantly higher than that in unmarried students (41.7) (P-value = 0.004). Comparison of the mean score of dependence on cell phone in boy and girl students based on t-test showed no significant difference (p-value = 0.9). Based on variance analysis test, there was a significant difference between students in terms of field of study (0.03) and semester (0.00) regarding dependence on cell phone. Additionally, Pearson’s correlation tests showed that there was a significant relationship between the time spent on the Internet/ using the cell phone and dependence on cell phone. (p-value = 0.00) Mean score of depression, anxiety, and stress in the students were 13.4±5.02, 12.4±4.2, and 15.7±5.2 respectively. Average time of using the Internet and cell phone were positively and significantly related with subscales of the study tools including depression, anxiety, and stress. That is, the higher the rate of using cell phone and the Internet, the higher the depression, anxiety, and stress. (Table 4) According to the results of regression analyses, there was a significant and positive relationship between Internet addiction and using cell phone; so that the higher the rate of being on the Internet, the higher the dependence on cell phone. (r = 0.4)

To measure the relationship of Internet addiction and dependence on cell phone with depression, anxiety, and stress, correlation coefficient was used. (Table 5)

Table 1- Demographics of the participants

<table>
<thead>
<tr>
<th>Variable</th>
<th>Subgroups</th>
<th>Frequency</th>
<th>Relative frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>F</td>
<td>167</td>
<td>72.9</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>62</td>
<td>27.1</td>
</tr>
<tr>
<td>Marital status</td>
<td>Married</td>
<td>40</td>
<td>17.13</td>
</tr>
<tr>
<td></td>
<td>Unmarried</td>
<td>189</td>
<td>82.87</td>
</tr>
<tr>
<td>Field of study</td>
<td>Nursing</td>
<td>60</td>
<td>26.2</td>
</tr>
<tr>
<td></td>
<td>Midwifery</td>
<td>30</td>
<td>13.1</td>
</tr>
<tr>
<td></td>
<td>Hygiene</td>
<td>50</td>
<td>12.8</td>
</tr>
<tr>
<td></td>
<td>Medicine</td>
<td>31</td>
<td>13.5</td>
</tr>
<tr>
<td></td>
<td>Lab sciences</td>
<td>22</td>
<td>9.6</td>
</tr>
<tr>
<td></td>
<td>Management</td>
<td>21</td>
<td>9.2</td>
</tr>
<tr>
<td></td>
<td>Medical emergency</td>
<td>15</td>
<td>6.6</td>
</tr>
<tr>
<td>Semester</td>
<td>2nd</td>
<td>33</td>
<td>14.4</td>
</tr>
<tr>
<td></td>
<td>4th</td>
<td>106</td>
<td>46.3</td>
</tr>
<tr>
<td></td>
<td>6th</td>
<td>84</td>
<td>36.7</td>
</tr>
<tr>
<td></td>
<td>8th</td>
<td>6</td>
<td>2.6</td>
</tr>
</tbody>
</table>

Table 2- Correlation coefficient between Internet addiction and demographical variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Correlation coefficient (r)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>-0.1</td>
<td>0.04</td>
</tr>
<tr>
<td>Time spend on the Internet</td>
<td>0.04</td>
<td>0.00</td>
</tr>
<tr>
<td>Time spend with cell phone</td>
<td>0.04</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Table 3- Comparing Internet addiction based on gender and marital status

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>SD</th>
<th>Test</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>F</td>
<td>47.9</td>
<td>±19.2</td>
<td>T=0.37</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>51.9</td>
<td>±21.9</td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td>Unmarried</td>
<td>48.4</td>
<td>±19.3</td>
<td>T=1.5</td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>51.5</td>
<td>±23.04</td>
<td></td>
</tr>
</tbody>
</table>
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Table 4 - Correlation coefficient of the time spent on the Internet and time of using cell phone with depression, anxiety, and stress

<table>
<thead>
<tr>
<th>Variable</th>
<th>Depression</th>
<th></th>
<th>Anxiety</th>
<th></th>
<th>Stress</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R</td>
<td>P</td>
<td>r</td>
<td>p</td>
<td>r</td>
<td>p</td>
</tr>
<tr>
<td>Time spent on the Internet</td>
<td>0.36</td>
<td>0.001</td>
<td>0.46</td>
<td>0.00</td>
<td>0.28</td>
<td>0.09</td>
</tr>
<tr>
<td>Time of using cell phone</td>
<td>0.23</td>
<td>0.00</td>
<td>0.52</td>
<td>0.00</td>
<td>0.47</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Table 5 - Pearson’s correlation coefficient of Internet addiction and dependence on cell phone with depression, anxiety, and stress

<table>
<thead>
<tr>
<th>Variable</th>
<th>Depression</th>
<th></th>
<th>Anxiety</th>
<th></th>
<th>Stress</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R</td>
<td>p</td>
<td>r</td>
<td>p</td>
<td>r</td>
<td>p</td>
</tr>
<tr>
<td>Internet addiction</td>
<td>0.23</td>
<td>0.00</td>
<td>0.37</td>
<td>0.00</td>
<td>0.25</td>
<td>0.00</td>
</tr>
<tr>
<td>Dependence on cell phone</td>
<td>0.27</td>
<td>0.00</td>
<td>0.42</td>
<td>0.00</td>
<td>0.37</td>
<td>0.00</td>
</tr>
</tbody>
</table>

**DISCUSSION AND CONCLUSION**

The results indicated no significant difference between boy and girl students with regard to Internet addiction and dependence on cell phone; so that the both genders were identical in this regard. This is consistent with Chio et al. (2013) who surveyed the relationship of genders with dependence on cell phone and Internet addiction in Taiwanese students [10]. In addition, Pirzade (2011) surveyed Internet addiction in students and found no significant difference between genders in this regard. [17] The results showed that the time spent on the Internet and using cell phone was positively and significantly related to mean score of Internet addiction and dependence on cell phone. In other words, students who spent longer time on the Internet or using cell phone were more addicted to the two technologies. These findings are consistent with Chepo et al. [10]. Apparently, the more the hours of using the Internet in one week, the higher the risk of Internet addiction, and individual would become more depended on the Internet. To avoid dependence on Internet, specific hours in a day should be determined and using the Internet should be limited to these hours. Vishener showed that there was a significant relationship between time spent on the Internet and development of Internet addiction so that people who limited their time on the Internet to specific hours experienced less dependency on the Internet comparing with those who had no specific time schedule for using the Internet. [22]

There was an inverse relationship between age and risk of Internet addiction. Increase of access to the Internet has decreased the minimum age of using it [18]. Other studies has reported similar results and higher risk of Internet addiction in younger generations. [23, 24] The time spent on the Internet was significantly and positively related to the all subscales under study (i.e. depression, anxiety, and stress). That is, the longer the time spent on the Internet, the higher the risk of these three disorders. This is consistent with Lashkarara (2011) [14], Aikin et al. (2011) [12], Bidi et al. (2012) [18].

Moreover, the number of hours of using cell phone was positively related with severity of depression, anxiety, and stress in students. This is consistent with Fohang et al. (2012) who concluded that anxiety led to increase in using cell phone [13]; and Toumi et al. (2007) who reported that excessive use of cell phone increased risk of stress and depression. [15] One explanation for this finding is that excessive use of cell phone dilutes family and social relationships and leads to seclusion and other problems, which in turn increase risk of depression. The results of regression analysis indicated that there was a
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positive and significant relationship between Internet addiction and dependence on cell phone. This finding is consistent with Branoei et al. (2009) [25] and Chio et al. (2013) [10]. One reason for the positive relationship between these two technologies is their similar function so that the both allow their users to communicate with each other. When they do not have access to their computer, students would use their cell phone to surf the Internet. This explains why Internet addiction is related to dependence on cell phone. Since cell phone can connect their user to the Internet anywhere and anytime, it long-run it creates Internet addiction. [18]. Internet use common and inevitable around the world, however prolonged and frequent using, are associated with psychosocial and psychological problems. The findings showed that3.7% of as sample of Iranian internet-using adolescents were internet addicts (25). Medical students are directly in interaction with society health, therefore they should be healthy otherwise they could not provide health for the society and people( 26).

Pearson' correlation coefficient indicated that Internet addiction was significantly related to depression, anxiety, and stress in students. Consistently, other studies have reported that Internet addiction led to psychological disorders such as depression and anxiety. [27-29].

Limitations
Some of the participants were reluctant to fill out the questionnaires due to a variety of reasons such as bad physical/mental conditions and tiredness. To solve the problem, the researcher would arranged another appointment or tried to gain trust of the participants for filling out the questionnaire. In addition, it is notable that the study was a cross-sectional work, while, IAD and its outcomes need more accurate and longer studies to determine the relationship among the variables under study more accurately.

Recommendations
Given the more advantages in preventing disease rather than curing them and since IAD and dependence on cell phone are health problems in the youth, it is imperative to introduce educational programs to teach the students and their parents about using the Internet and cell phone. In this regard, the parents could be informed about their role as controller and supervisor of their children using the Internet and cell phones. The results could be useful in the students’ consultation centers. Psychologists and consultants need to examine effectiveness of consultation approaches, self-regulation method, and time-management techniques on preventing excessive use of the Internet and cell phone.

Moral considerations
The participants were ensured about confidentiality of their information and that they could leave the study whenever they would wanted. Before filling out the questionnaires, the participants signed a written letter of consent and received adequate information about the study, its objectives, and methodology.

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