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2 Internet addiction and its psychosocial risks (depression, anxiety, stress and loneliness) among
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8 Running Title: Internet Addiction among Iranian Adolescents and Young Adults

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15 **Abstract**

16 Internet addiction has become an increasingly researched area in many Westernized countries.
17 However, there has been little research in developing countries such as Iran, and when research
18 has been conducted, it has typically utilized small samples. This study investigated the
19 relationship of Internet addiction with stress, depression, anxiety, and loneliness in 1,052 Iranian
20 adolescents and young adults. The participants were randomly selected to complete a battery of
21 psychometrically validated instruments including the Internet Addiction Test, Depression
22 Anxiety Stress Scale, and the Loneliness Scale. Structural equation modeling and Pearson
23 correlation coefficients were used to determine the relationship between Internet addiction and
24 psychological impairments (depression, anxiety, stress and loneliness). Pearson correlation, path
25 analysis, multivariate analysis of variance (MANOVA), and t-tests were used to analyze the data.
26 Results showed that Internet addiction is a predictor of stress, depression, anxiety, and
27 loneliness. Findings further indicated that addictive Internet use is gender sensitive and that the
28 risk of Internet addiction is higher in males than in females. The results showed that male
29 Internet addicts differed significantly from females in terms of depression, anxiety, stress, and
30 loneliness. The implications of these results are discussed.

31 **Keywords:** Internet addiction, Stress, Depression, Anxiety, Loneliness

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34 **1. Introduction**

35 Easy access to the Internet has led to an increase in the number of studies investigating the
36 incidence and prevalence of Internet addiction (IA) (Pontes, Kuss & Griffiths, 2015). Prevalence
37 of IA among adolescents and adults in Western and Eastern countries has gained the attention of
38 researchers from different disciplines such as communication, education and psychology (Caplan
39 & High, 2007; Greenfield, 2007; Li, O'Brien, Snyder, & Howard, 2015; Yen et al., 2008). Social
40 and behavioral scholars generally concur that IA phenomenon exists and causes unhealthy
41 psychological and social well-being (Shapira et al., 2003; Stavropoulos, Alexandraki, & Motti-
42 Stefanidi, 2013; Wang & Wang, 2011; Yao & Zhong, 2014) among users, especially adolescents
43 (Christakis, 2010; Smahel, Brown, & Blinka, 2012). This is because adolescents spend a lot of
44 time on the Internet to establish and maintain social interactions with other people (Valkenburg
45 & Peter, 2007).

46 Several psychological studies associated IA with personality traits of adolescents (i.e.,
47 aggression and lack of self-control) (Öztürk, Bektas, Ayar, Özgüven Öztornacı, & Yağcı, 2015)
48 The social and emotional risks of IA and its treatments have also been studied extensively (Hahn
49 & Kim, 2014; Ko, Yen, Yen, Chen, & Chen, 2012). Although many studies have identified
50 depression, loneliness, anxiety, and stress as major social and emotional risks associated with IA,
51 quantitative studies describing this phenomenon in developing countries (such as Iran where the
52 present study was carried out) remain rare, even though one study claimed the prevalence rate of
53 IA in Iran is 22% (Ahmadi & Saghafi, 2013). Therefore, the present study attempts to investigate
54 the link between several psychosocial variables (loneliness, depression, anxiety, and stress) with
55 IA among Iranians using a structured model.

56 **1.1. Literature review**

57 **1.1.1. Conceptualization of Internet Addiction**

58 Scholars have not reached a consensus on the definition of IA and consequently, IA is used
59 interchangeably with terms such as Internet dependence, compulsive Internet use, problematic
60 Internet use, and Internet use disorder among others (Huang, Chen, Wang, & Wang, 2014). IA
61 has often been referred to as the failure or lack of ability of a person to manage their use of the
62 Internet, and that consequently triggers emotional and social difficulties in a person's personal
63 and professional life (Pontes et al, 2015; Young & Rogers, 1998). Researchers have attempted to
64 operationally define IA by examining its diagnostic criteria, including (i) preoccupation, (ii)
65 social isolation, (iii) anxiety, (iv) psychological addiction, (v) loss of control, (vi) withdrawal
66 symptoms, (vii) lack of ability to decrease Internet use, (viii) increasing tolerance, and (ix)
67 increasing Internet use despite awareness of its detrimental consequences (Widyanto, Griffiths,
68 Brunsten, & McMurrin, 2007).

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70 **1.1.2. Predictors of Internet Addiction**

71 The theoretical perspective of displacement theory hypothesizes that involvement in online
72 social activities displaces offline interaction with friends and family members, thereby
73 preventing a person from establishing or sustaining social relationships and negatively affecting
74 the psychological wellbeing of the person (Valkenburg & Peter, 2011). In line with this
75 interpretation, researchers have investigated the relationship between IA and psychosocial
76 wellbeing. For instance, Alavi and his associates (2010) examined the effect of excessive
77 Internet use on psychiatric symptoms among 250 Iranian students and found that excessive
78 Internet use was correlated positively with these symptoms (e.g., depression and anxiety). Lee
79 and Leeson (2015) investigated IA and social anxiety among 626 adults and found that IA

80 significantly predicted depression and social interaction anxiety. Weinstein, Dorani, Elhadif et al.
81 (2015) reported a positive correlation between IA and anxiety among male and female university
82 students in Israel. Similarly, Hong, Huang, Lin and Chiu (2014) investigated depressive
83 symptoms among Internet and Facebook addicts in Korea and Greece, respectively, and reported
84 similar results. In another study, Yao and Zhong (2014) investigated the causal link between IA
85 and the psychological well-being among college students in Hong Kong and found that IA raised
86 the level of loneliness over time. Although depression was reported to be positively associated
87 with IA, the relationship became insignificant over time. The analysis also showed that online
88 socialization did not reduce feelings of loneliness.

89 Several studies have examined the association between IA and stress among adolescents. For
90 instance, Yadav, Banwari, Parmar and Maniar (2013) examined how some psychological
91 variables may vary with IA among 621 students in India. In Turkey (Akin & Iskender, 2011) and
92 in the United States (Nie, Hillygus, & Erbring, 2002), it has been reported that students addicted
93 to the Internet spend less time with family and friends than non-users, and feel more stressed out
94 and anxious. In contrast, several studies have shown that the Internet provides an ideal social
95 platform for lonely people to interact with others, widen their social network, improve their well-
96 being, and recover from depression or stress (Tang et al., 2014).

97 Several studies have found that IA is related to gender. However, the results of these studies
98 are far from conclusive. For instance, several studies indicate that men (Sharma, Sahu, Kasar, &
99 Sharma, 2014) are at a greater risk of IA, while other studies have not found any association
100 between gender and IA (Hwang et al., 2014). Differences in findings may be due to different
101 factors, such as cultural differences in Internet use, purpose of Internet use, and Internet
102 availability (Alavi et al., 2010). Despite the growing concern over the increasingly excessive

103 Internet use among Iranian adolescents, little is known about how Internet use affects their
104 psychosocial wellbeing.

105 Currently, the majority of studies on IA have been conducted in developed countries (Kuss et
106 al., 2014) rather than developing countries, such as Iran. Moreover, studies in the Iranian context
107 have been limited to small sample sizes (Nastizai, 2009). Therefore, the present study is an
108 attempt to answer the following questions and address the gaps in literature: (1) What are the
109 differences in the effects of Internet use on depression, loneliness, anxiety, and stress between IA
110 and non-IA groups among Iranian Internet users? (2) What is the relationship between gender
111 and IA among Iranian Internet users?

112 In the present study, depression is operationally defined as an unpleasant emotional state
113 demonstrated by several symptoms, such as negative and pessimistic attitudes, and loss of
114 impulsiveness. Anxiety is defined as an emotional state leading to nervous behaviors. Stress is
115 defined as an emotional state of physical and mental strain caused by factors changing an
116 existing equilibrium. Loneliness is defined as an unpleasant emotional reaction to isolation or
117 lack of friendship accompanied by anxiety (Akin & Iskender, 2011). It is hypothesized that
118 Iranian individuals defined as Internet addicts will be significantly more likely to be depressed,
119 anxious, stressed, and lonely compared to Iranian non-Internet addicts.

120 **2. Methods**

121 **2.1. Participants**

122 The participants comprised 1,052 home Internet users selected randomly from subscribers of
123 Iranian Internet provider companies. The participants' ages were 16 years and above ($M=32.3$
124 years, $SD=3.30$). Among the participants, 59% were male ($n=624$) and 41% were female

125 (n=428). Their level of education varied from high school to PhD. In the present study, an
126 Internet addict was operationally defined as anyone who scored more than 61 on the IA Test
127 whereas a non-addict was anyone who scored less than 60 (Young, 1998). Among the
128 participants, 420 were classed as non-addicts and 632 were classed as Internet addicts. Among
129 the 632 individuals classed as addicted, 431 were male and 201 were female, whereas among the
130 420 non-addicted individuals, 155 were male and 265 were female.

131 **2.2 Measures**

132 Three psychometric instruments were utilized to assess the variables in this study (i.e.,
133 Depression Anxiety and Stress Scale-21, the Internet Addiction Test, and the Loneliness Scale).

134 **2.2.1. Depression Anxiety and Stress Scale-21 (DASS-21)**

135 The DASS-21 (Lovibond & Lovibond, 1995), comprises 21 questions, and assesses three
136 separate dimensions of negative emotional states including anxiety, depression, and stress (see
137 Table 1). Each of the three emotional subscales has seven questions. Each item is rated on a five-
138 point Likert scale ranging from always (0) to never (4). Questions 1 to 7 assess depression,
139 questions 8 to 14 assess anxiety, and questions 15 to 21 assess stress. The total scores of the
140 instrument range from 0 to 42. The internal consistency of the original version of the entire
141 DASS-21 was excellent ($\alpha=0.93$) with subscales found to be satisfactory to high:
142 depression=0.88; anxiety=0.82 and stress=0.90 (Henry & Crawford, 2005). The instrument was
143 translated from English to Persian by Sahebi, Asghari and Salari (2005). Based on this
144 translation, this version had acceptable validity and reliability in an Iranian context. The total
145 reliability of the scale was 0.88, whereas that the subscales for depression, anxiety, and stress
146 were 0.77, 0.79 and 0.78, respectively. Internal consistency, convergent validity, and concurrent

147 validity of DASS-21 were also in the acceptable to excellent ranges. In the present study, the
148 total reliability of the scale, calculated via Cronbach's alpha, was 0.94, whereas the reliability of
149 the subscales for depression, anxiety, and stress were 0.96, 0.94 and 0.89, respectively.

150

151 **2.2.2. Internet Addiction Test (IAT)**

152 The IAT (Young & Rogers, 1998) assesses Internet addiction. The instrument comprises 20
153 items, and is divided into six dimensions (i.e., salience, excessive use, neglect of work,
154 anticipation, self-control, and neglect of social relationships). Each item is assessed on a five-
155 point Likert scale, ranging from 1 (rarely) to 5 (always). The scores range from a minimum of
156 20 to a maximum of 100 (20 to 49 = average online user, 50 to 79 = experiencing occasional or
157 frequent problems with Internet use, and 80 to 100 = internet use is causing significant
158 problems) (Ghamari, Mohammadbeigi, Mohammadsalehi, & Hashiani, 2011). The higher score
159 shows more dependence on the Internet. This inventory has been also used by other
160 investigators of IA and has shown good but varied psychometric properties in relation to factor
161 structure (Khazaal et al., 2008; Widyanto & McMurrin, 2004). The results of internal
162 consistency (Cronbach's alpha) within the items in each subscales exhibited high to moderate
163 reliability. In the present study, the Persian version had a Cronbach's α reliability of 0.92.

164

165 **2.2.3. Loneliness Scale (LS)**

166 The Persian version of the Loneliness Scale (LS) was developed by Dehshiri, Borjali,
167 Sheykhi and Habibi. It is a 38-item self-report instrument that assesses the loneliness of
168 individuals. Each item is scored on a five-point Likert scale ranging from very strongly (1) to

169 not at all (5). The factor analysis of the final version displayed three subscales as follows:
170 loneliness due to relationship with family (16 items; $\alpha=0.80$), loneliness due to relationship
171 with friends (11 items; $\alpha=0.88$), and affective symptoms of loneliness (10 items; $\alpha=0.79$).
172 Higher scores demonstrate higher levels of loneliness. Test-retest reliability and internal
173 consistency were 0.84 and 0.91, respectively. Convergent and divergent validities were
174 acceptable. In the present study, LS had a Cronbach's α reliability of 0.98.

175 **2.3. Procedure and data collection**

176 The study was conducted between September 2014 and March 2015. After receiving
177 permission from Internet provider companies in Iran (*IranCell, TCI, Mobinnet* and *Shatel*),
178 subscribers were informed of the goals of the study via email. The subscribers were assured that
179 confidentiality and anonymity considerations would be observed. Subscribers willing to
180 participate in the study confirmed their consent via email. Approximately 1300 confirmation
181 emails were received. The researchers sent 1300 booklets including valid and reliable Persian
182 versions of young IAT, DASS-21 and LS to participants via email. Of the 1300 distributed
183 booklets, 1052 were returned.

184

185 **2.4. Data analysis**

186 In the present study, structural equation modeling (SEM) and Pearson correlation
187 coefficients were conducted to establish the relationship between IA, stress, anxiety, depression
188 and loneliness. A correlation matrix of the variables was examined and multivariate analysis of
189 variance (MANOVA) was conducted with four statistical measures (i.e., Pillai's criterion,
190 Wilk's lambda, Hotelling's trace, and Roy's Largest Root) to explore interactions between IA,

191 stress, anxiety, depression, and loneliness. A t-test was also applied to the data to compare the
192 difference mean scores between males and females with respect to IA. Data were analyzed
193 using AMOS 19 and SPSS 21 software.

194

195 **3. Results**

196 Before employing MANOVA, bivariate Pearson's correlation coefficients were run to
197 determine the association between the variables (see Table 2). The results revealed that significant
198 correlations ($p < 0.01$) exist among the variables. In Table 2, IA is significantly and positively
199 related to increased stress ($r = 0.57, p < 0.01$), anxiety ($r = 0.54, p < 0.01$), depression ($r = 0.68, p < 0.01$)
200 and loneliness ($r = 0.67, p < 0.01$) (i.e., individuals with higher levels of IA had higher levels of
201 stress, anxiety, depression and loneliness). An independent MANOVA was performed to examine
202 the difference between Internet-addicted and non-addicted groups on the study's four dependent
203 variables (i.e., stress, anxiety, depression, and loneliness). The results showed that individuals
204 with IA had significantly increased levels of stress, anxiety, depression and loneliness (Table 3)
205 compared to those classed as non-IA individuals: Pillai Trace (0.97), Wilk's Lambda (0.94),
206 Hotelling Lawley Trace (0.91), and Roy's Largest Root (0.91), ($P < 0.01$) existed for Internet-
207 addicted and non-addicted groups.

208 The F values for the study variables were: stress ($F = [5, 1047] = 60.93, p < 0.001$), depression
209 ($F = [5, 1047] = 66.12, p < 0.001$), anxiety ($F = [5, 1047] = 65.57, p < 0.001$) and loneliness ($F = [5,$
210 $1047] = 58.83, p < 0.001$). The mean scores of the dependent variables of the Internet-addicted
211 group (i.e., depression, anxiety, stress, and loneliness) were higher than the mean scores of the
212 non-addicted group (see Table 4). SEM with maximum likelihood (ML) estimation was

213 conducted to verify whether the assumed model provided good fit with the data. The results
214 revealed that the overall model was fit for the sample because the different fit indices for the
215 base model were appropriate and at the acceptable ranges ($\chi^2=1.26$, $df=1$, $p<0.001$; GFI=0.93;
216 AGFI=0.91; CFI=0.91; NFI=0.90; RFI=0.93; IFI=0.94 and RMSEA=0.038) (see Figure 1). Here,
217 the model accounted for 39% variance of stress, 40% variance of anxiety, 45% variance of
218 depression, and 39% variance of loneliness.

219 T-tests were performed to investigate the differences between males and females concerning
220 the four variables of the study (i.e., stress, anxiety, depression, and loneliness) among the IA
221 groups. The findings revealed a significant difference in the variables between females and males
222 in the addicted group [(t Stress=2.26, $p<0.01$); (t anxiety=2.19, $p<0.01$); (t Depression=3.51,
223 $p<0.01$) and (t Loneliness=1.18, $p<0.01$)]. Males obtained higher mean scores on all these
224 variables (see Table 5).

225

226 **4. Discussion**

227 Previous research has demonstrated that adolescents and young adults use the Internet more
228 frequently than any other age group, for different purposes, such as entertainment or
229 communication with friends and strangers (Valkenburg & Peter, 2011). Therefore, this group of
230 users appears to be more vulnerable to IA and its psychosocial problems (Smahel et al., 2012;
231 Valkenburg & Peter, 2011). The present study examined a number of psychosocial risks of IA
232 (i.e., stress, depression, anxiety, and loneliness) between male and female Iranian Internet addict
233 and non-addict groups. The findings indicated that addictive Internet use is gender sensitive and
234 that the risk of IA is greater for Iranian males than females, and that Iranian male Internet addicts

235 are more subject to depression, anxiety, stress, and loneliness. Similarly, previous studies have
236 shown that males are more prone to becoming Internet addicts than females (Adiele & Olatokun,
237 2014; Sharma et al., 2014). However, several studies have reported that gender does not predict
238 IA (Ha & Hwang, 2014; Smahel et al., 2012; Yadav et al., 2013). The difference in the findings
239 could be related to cultural differences in Internet use, the purpose of Internet use, and nature of
240 Internet service on offer (Li et al., 2015).

241 As expected, the mean scores on stress, depression, anxiety, and loneliness among Internet
242 addicts were higher than those of non-addicts. These findings suggest that the more addicted a
243 person is to the Internet, the more stressed, depressed, anxious, and lonely the person is. The
244 scores were consistent with the results of previous studies carried out in developed countries,
245 which have reported a significant and positive relationship between IA, stress, depression,
246 anxiety, and loneliness (Hwang et al., 2014; Weinstein et al., 2015)

247 However, drawing a causal relationship between such psychosocial impairments and IA
248 requires further investigation. Some scholars suggest that the association between IA and
249 psychological symptoms cannot be easily determined. For instance, Yadav and colleagues (2013)
250 argued that differentiation of anxiety, stress, and depression is difficult, and for students,
251 admitting they are anxious or stressed is easier than admitting they are depressed. Some scholars
252 argue that whether the use of the Internet for different purposes has negative or positive
253 psychosocial effects may depend on the individual. Kraut et al. (2002) noted that although the
254 Internet might be beneficial to well-adjusted individuals, it may have detrimental effects on
255 poorly adjusted adolescents who spend a considerable amounts of time on the Internet.

256 The association between IA and psychological symptoms appears to be reciprocal, indicating
257 that excessive Internet use might increase levels of social isolation and may lead to depression.

258 Life stressors (e.g., school-related problems), anxiety, low self-esteem, and motivation may also
259 increase the risk of IA (Tang et al., 2014) especially for a depressed person (Wang & Wang,
260 2011).

261

262 **5. Limitations and implications**

263 The findings of the present study should be interpreted with caution. First, the study shows
264 that psychosocial impairments do not clearly precede IA nor are they a result of excessive
265 Internet use. Further studies with a more comprehensive analysis may indicate whether causal
266 relationships between psychosocial variables and IA can be established. Second, data were
267 collected via self-reported questionnaires from adolescents and young adults via subscribers to
268 online sites. This non-representative self-selecting sampling strategy was likely to include very
269 excessive users of the Internet (and was reflected in the high rates of IA) and the methodology of
270 self-report includes many well known biases (e.g., social desirability bias, recall bias, etc.).
271 Future studies could use different methodologies (e.g., structured interviews), different sample
272 populations and/or different subgroups of adolescents. A separate survey could be carried out to
273 examine other demographic factors, such as study duration, marital status, and education. The
274 results of this study also have several implications. For instance, the findings suggest that
275 excessive Internet users need to focus on other hobbies/activities that do not require online
276 access. The culture of Internet use requires more attention, especially from parents so they can
277 supervise Internet usage of their teenage and/or young adult children.

278

279 **6. Conclusion**

280 The present study is the first attempt to present a quantitative model describing the association
281 between psychosocial symptoms (loneliness, depression, anxiety, and stress) with IA among
282 Iranian adolescents and young adults. Further research on IA is needed in developing countries
283 such as Iran. Internet addicts need to be screened and monitored to identify psychosocial
284 symptoms of excessive online use.

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401

402

403 Table 1: The scoring procedure of DASS-21

| Degree | Variable | | |
|-------------|------------|---------|--------|
| | Depression | Anxiety | Stress |
| Normal | 0- 4 | 0- 3 | 0-7 |
| Mild | 5-6 | 4-5 | 8-9 |
| Moderate | 7-10 | 6-7 | 10-12 |
| Severe | 11-13 | 8-9 | 13-16 |
| Very severe | 14+ | 10+ | 17+ |

404 ** $p < .01$

405

406 Table 2: Descriptive statistics, inter-correlations and alphas for Internet addiction, stress, anxiety,
 407 and loneliness

| Variable | Internet Addiction | Stress | Anxiety | Depression | Loneliness |
|--------------------|-----------------------|--------|---------|------------|------------|
| Internet Addiction | | | | | |
| Stress | .577** | | | | |
| Anxiety | .549** | .641** | | | |
| Depression | .681** | .692** | .636** | | |
| Loneliness | .674** | .575** | .496** | .535** | 1 |
| Cronbach's Alpha | .95 | .89 | .94 | .96 | .98 |
| M | 48.28 | 17.11 | 14.39 | 15.15 | 27.96 |
| SD | 21.32 | 4.75 | 4.84 | 4.82 | 5.57 |

408 ** $p < .01$

409

410 Table 3: Results of the MANOVA analysis for Internet addicted and non-addicted groups

| Value | | DF | EF | Sig. |
|--------------------|------|----|------|-------|
| Pillai's Trace | 0.97 | 5 | 1044 | 0.001 |
| Wilks' Lambda | 0.94 | 5 | 1044 | 0.001 |
| Hotelling's Trace | 0.91 | 5 | 1044 | 0.001 |
| Roy's Largest Root | 0.91 | 5 | 1044 | 0.001 |

411

412

413 Table 4: ANOVA results of the interaction between Internet addiction on stress, depression,
414 anxiety and loneliness

| Variables | Internet addicted group | Non addicted group | Mean | F | Sig. |
|------------|-------------------------|--------------------|--------|-------|-------|
| | M (S.D) | M (S.D) | Square | | |
| Stress | 43.2 (3.41) | 32.7 (3.66) | 116.16 | 60.93 | 0.001 |
| Depression | 68.5 (4.56) | 44.9 (3.81) | 129.73 | 66.12 | 0.001 |
| Anxiety | 54.8 (3.75) | 37.1 (2.32) | 129.46 | 65.57 | 0.001 |
| Loneliness | 41.5 (3.23) | 29.7 (3.05) | 131.12 | 58.83 | 0.001 |

415

416

417 Table 5: Results of t-tests for males and females regarding stress, anxiety, depression and
418 loneliness in the Internet addicted group

| Variables | Male M (S.D) | Female M (S.D) | t | p |
|------------|-----------------|-------------------|------|------|
| Stress | 7.11 (3.06) | 5.57 (2.39) | 2.26 | .001 |
| Anxiety | 5.13 (2.55) | 3.48 (2.45) | 2.19 | .000 |
| Depression | 8.18 (3.01) | 5.66 (1.91) | 3.51 | .000 |
| Loneliness | 7.21 (2.90) | 6.59 (2.86) | 1.18 | .214 |

419

420

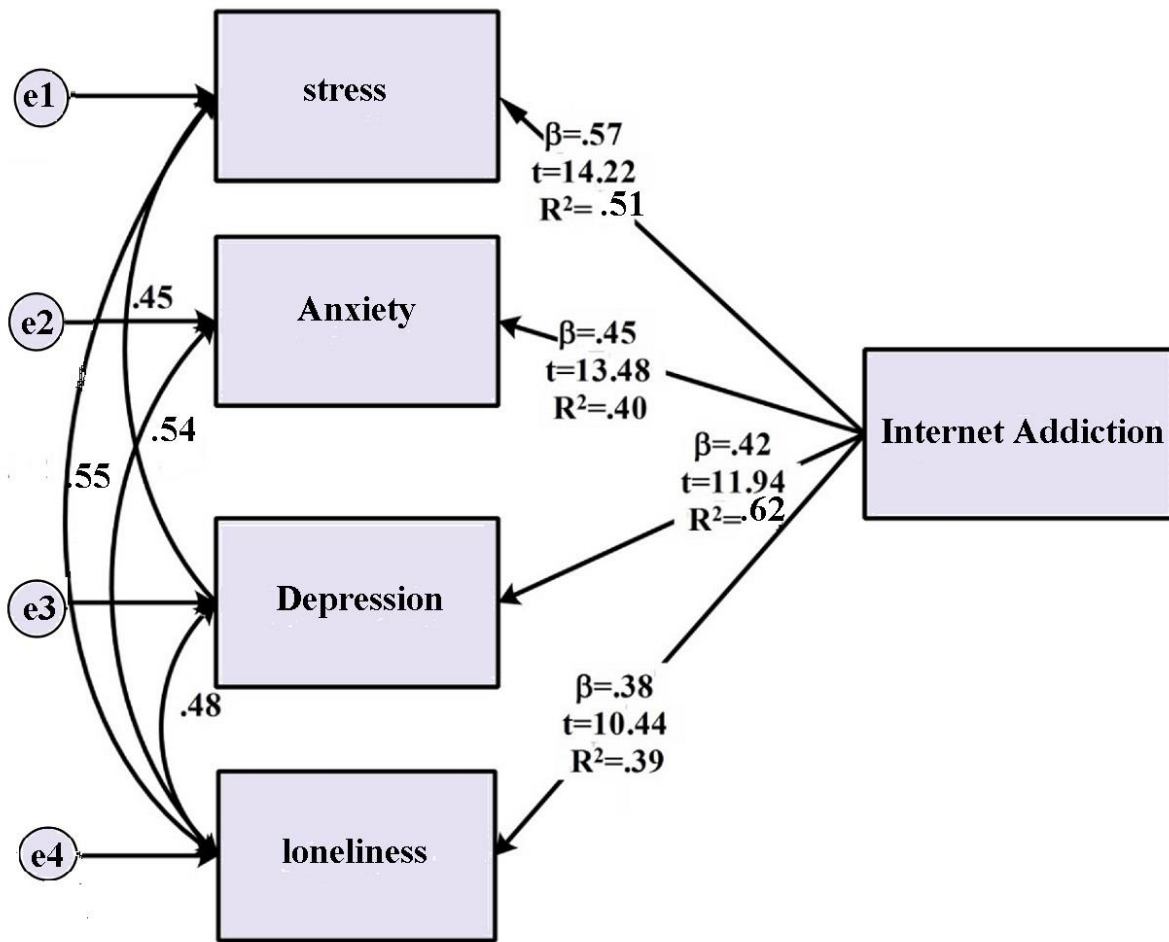
421 **Figure Caption**

422

423 **Fig.1.** Path Analysis between Internet Addiction, Depression, Anxiety, Stress and Loneliness

424 **Figure 1:**

425



426