

Internet Addiction and its Psychosocial Risks (Depression, Anxiety, Stress and Loneliness) among Iranian Adolescents and Young Adults: A Structural Equation Model in a Cross-Sectional Study

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Abstract Internet addiction has become an increasingly researched area in many Westernized countries. However, there has been little research in developing countries such as Iran, and when research has been conducted, it has typically utilized small samples. This study investigated the relationship of Internet addiction with stress, depression, anxiety, and loneliness in 1052 Iranian adolescents and young adults. The participants were randomly selected to complete a battery of psychometrically validated instruments including the Internet Addiction Test, Depression Anxiety Stress Scale, and the Loneliness Scale. Structural equation modeling and Pearson correlation coefficients were used to determine the relationship between Internet addiction and psychological impairments (depression, anxiety, stress and loneliness). Pearson correlation, path analysis, multivariate analysis of variance (MANOVA), and t-tests were used to analyze the data. Results showed that Internet addiction is a predictor of stress, depression, anxiety, and loneliness. Findings further indicated that addictive Internet use is gender sensitive and that the risk of Internet addiction is higher in males than in females. The results showed that male Internet addicts differed significantly from females in terms of depression, anxiety, stress, and loneliness. The implications of these results are discussed.

Keywords Internet addiction · Stress · Depression · Anxiety · Loneliness

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

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

Literature Review

Conceptualization of Internet Addiction

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

Predictors of Internet Addiction

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

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

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

Several studies have found that IA is related to gender. However, the results of these studies are far from conclusive. For instance, several studies indicate that men (Sharma et al. 2014) are at a greater risk of IA, while other studies have not found any association between gender and IA (Hwang et al. 2014). Differences in findings may be due to different factors, such as cultural differences in Internet use, purpose of Internet use, and Internet availability (Alavi et al. 2010). Despite the growing concern over the increasingly excessive Internet use among Iranian adolescents, little is known about how Internet use affects their psychosocial wellbeing.

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

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

Methods

Participants

The participants comprised 1052 home Internet users selected randomly from subscribers of Iranian Internet provider companies. The participants' ages were 16 years and above ($M=32.3$ years, $SD=3.30$). Among the participants, 59 % were male ($n=624$) and 41 %

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

Measures

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

Depression Anxiety and Stress Scale-21 (DASS-21)

The DASS-21 (Lovibond & Lovibond 1995), comprises 21 questions, and assesses three separate dimensions of negative emotional states including anxiety, depression, and stress (see Table 1). Each of the three emotional subscales has seven questions. Each item is rated on a five-point Likert scale ranging from always (0) to never (4). Questions 1–7 assess depression, questions 8–14 assess anxiety, and questions 15–21 assess stress. The total scores of the instrument range from 0 to 42. The internal consistency of the original version of the entire DASS-21 was excellent ($\alpha=0.93$) with subscales found to be satisfactory to high: depression=0.88; anxiety=0.82; and stress=0.90 (Henry and Crawford 2005). The instrument was translated from English to Persian by Sahebi et al. (2005). Based on this translation, this version had acceptable validity and reliability in an Iranian context. The total reliability of the scale was 0.88, whereas that the subscales for depression, anxiety, and stress were 0.77, 0.79 and 0.78, respectively. Internal consistency, convergent validity, and concurrent validity of DASS-21 were also in the acceptable to excellent ranges. In the present study, the total reliability of the scale, calculated via Cronbach's α , was 0.94, whereas the reliability of the subscales for depression, anxiety, and stress were 0.96, 0.94 and 0.89, respectively.

Internet Addiction Test (IAT)

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

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+

Loneliness Scale (LS)

The Persian version of the Loneliness Scale (LS) was developed by Dehshiri et al. (2008). It is a 38-item self-report instrument that assesses the loneliness of individuals. Each item is scored on a five-point Likert scale ranging from very strongly (1) to not at all (5). The factor analysis of the final version displayed three subscales as follows: loneliness due to relationship with family (16 items; $\alpha = 0.80$), loneliness due to relationship with friends (11 items; $\alpha = 0.88$), and affective symptoms of loneliness (10 items; $\alpha = 0.79$). Higher scores demonstrate higher levels of loneliness. Test-retest reliability and internal consistency were 0.84 and 0.91, respectively. Convergent and divergent validities were acceptable. In the present study, LS had a Cronbach's α reliability of 0.98.

Procedure and Data Collection

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

Data Analysis

In the present study, structural equation modeling (SEM) and Pearson correlation coefficients were conducted to establish the relationship between IA, stress, anxiety, depression and loneliness. A correlation matrix of the variables was examined and multivariate analysis of variance (MANOVA) was conducted with four statistical measures (i.e., Pillai's Criterion, Wilk's Lambda, Hotelling's Trace, and Roy's Largest Root) to explore interactions between IA, stress, anxiety, depression, and loneliness. A *t*-test was also applied to the data to compare the difference mean scores between males and females with respect to IA. Data were analyzed using AMOS 19 and SPSS 21 software.

Results

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

The F values for the study variables were: stress ($F = [5, 1047] = 60.93, p < 0.001$), depression ($F = [5, 1047] = 66.12, p < 0.001$), anxiety ($F = [5, 1047] = 65.57, p < 0.001$) and loneliness ($F = [5, 1047] = 58.83, p < 0.001$). The mean scores of the dependent variables of the Internet-addicted group (i.e., depression, anxiety, stress, and loneliness) were higher than the mean scores of the non-addicted group (see Table 4). SEM with maximum likelihood (ML) estimation was conducted to verify whether the assumed model provided good fit with the data. The results revealed that the overall model was fit for the sample because the different fit indices for the base model were appropriate and at the acceptable ranges ($\chi^2 = 1.26, df = 1, p < 0.001$; $GFI = 0.93$; $AGFI = 0.91$; $CFI = 0.91$; $NFI = 0.90$; $RFI = 0.93$; $IFI = 0.94$ and $RMSEA = 0.038$) (see Fig. 1). Here, the model accounted for 39 % variance of stress, 40 % variance of anxiety, 45 % variance of depression, and 39 % variance of loneliness.

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

Table 2 Descriptive statistics, inter-correlations and alphas for Internet addiction, stress, anxiety, 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

** $p < .01$

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

Discussion

Previous research has demonstrated that adolescents and young adults use the Internet more frequently than any other age group, for different purposes, such as entertainment or communication with friends and strangers (Valkenburg and Peter 2011). Therefore, this group of users appears to be more vulnerable to IA and its psychosocial problems (Smahel et al. 2012; Valkenburg and Peter 2011). The present study examined a number of psychosocial risks of IA (i.e., stress, depression, anxiety, and loneliness) between male and female Iranian Internet addict and non-addict groups. The findings indicated that addictive Internet use is gender sensitive and that the risk of IA is greater for Iranian males than females, and that Iranian male Internet addicts are more subject to depression, anxiety, stress, and loneliness. Similarly, previous studies have shown that males are more prone to becoming Internet addicts than females (Adiele and Olatokun 2014; Sharma et al. 2014). However, several studies have reported that gender does not predict IA (Ha and Hwang 2014; Smahel et al. 2012; Yadav et al. 2013). The difference in the findings could be related to cultural differences in Internet use, the purpose of Internet use, and nature of Internet service on offer (Li et al. 2015).

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

However, drawing a causal relationship between such psychosocial impairments and IA requires further investigation. Some scholars suggest that the association between IA and psychological symptoms cannot be easily determined. For instance, Yadav et al. (2013) argued that differentiation of anxiety, stress, and depression is difficult, and for students, admitting they are anxious or stressed is easier than admitting they are depressed. Some scholars argue that whether the use of the Internet for different purposes has negative or positive psychosocial effects may depend on the individual. Kraut et al. (2002) noted that although the Internet might

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

Variables	Internet addicted group M (S.D)	Non addicted group M (S.D)	Mean Square	F	Sig.
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

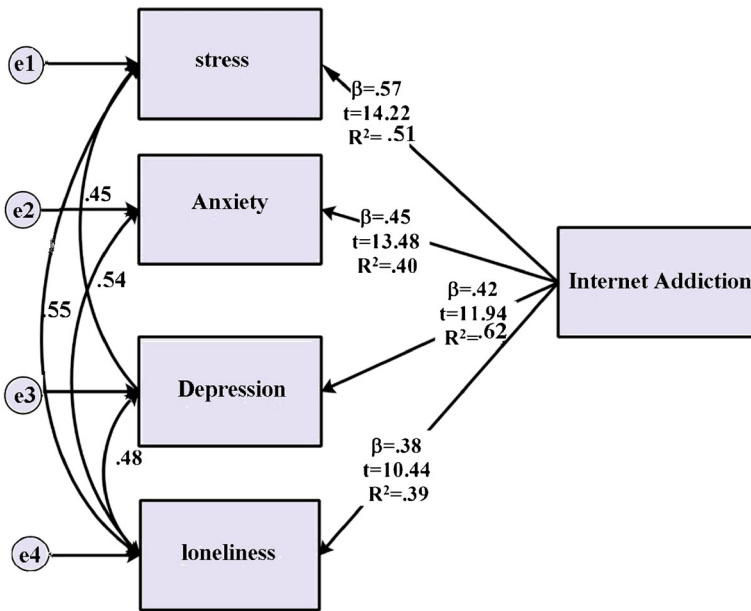


Fig. 1 Path Analysis between Internet Addiction, Depression, Anxiety, Stress and Loneliness

be beneficial to well-adjusted individuals, it may have detrimental effects on poorly adjusted adolescents who spend a considerable amounts of time on the Internet.

The association between IA and psychological symptoms appears to be reciprocal, indicating that excessive Internet use might increase levels of social isolation and may lead to depression. Life stressors (e.g., school-related problems), anxiety, low self-esteem, and motivation may also increase the risk of IA (Tang et al. 2014) especially for a depressed person (Wang and Wang 2011).

Limitations and Implications

The findings of the present study should be interpreted with caution. First, the study shows that psychosocial impairments do not clearly precede IA nor are they a result of excessive Internet use. Further studies with a more comprehensive analysis may indicate whether causal

Table 5 Results of t-tests for males and females regarding stress, anxiety, depression and 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

relationships between psychosocial variables and IA can be established. Second, data were collected via self-reported questionnaires from adolescents and young adults via subscribers to online sites. This non-representative self-selecting sampling strategy was likely to include very excessive users of the Internet (and was reflected in the high rates of IA) and the methodology of self-report includes many well known biases (e.g., social desirability bias, recall bias, etc.). Future studies could use different methodologies (e.g., structured interviews), different sample populations and/or different subgroups of adolescents. A separate survey could be carried out to examine other demographic factors, such as study duration, marital status, and education. The results of this study also have several implications. For instance, the findings suggest that excessive Internet users need to focus on other hobbies/activities that do not require online access. The culture of Internet use requires more attention, especially from parents so they can supervise Internet usage of their teenage and/or young adult children.

Conclusion

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

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