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Relationship of Internet addiction with impulsivity and severity of psychopathology among Turkish university students



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ABSTRACT

The previous studies have found a relationship between IA and both impulsivity and psychopathology when they were considered separately. The aim of this study was to investigate the relationship of Internet addiction (IA) with impulsivity and severity of psychopathology among Turkish university students. We also wanted to control the effect of impulsivity dimensions on the relationship between IA and psychopathology. A total of 319 university students from two universities in Ankara participated to the study. Students were assessed through the Internet Addiction Scale (IAS), the Symptom Checklist-Revised (SCL-90-R) and the Barratt Impulsiveness Scale-11 (BIS-11). Correlational analyses revealed that severity of IA was related to both SCL-90-R and BIS-11 scores. Among SCL-90-R subscales, severity of obsessive-compulsive symptoms (OCS) was the only predictor for IAS score. Hierarchical regression analysis indicated that interpersonal sensitivity, additional to attentional and motor impulsiveness, was the predictor of IAS score. Although severity of IA is associated with wide range of psychopathology, particularly OCS, interpersonal sensitivity seems to be the main dimension that predict severity of IAS additional to impulsiveness (attentional and motor). Impulsivity seems to be an important construct when considering IA and its treatment among Turkish university students.

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1. Introduction

1.1. Internet addiction

Internet use is very common all around the world, especially for academic and recreational purposes (Yen et al., 2007). The research which was conducted in Turkey also has demonstrated the wide and increasing use of the Internet (Turkish Statistical Institute, 2012). Information and communication technology usage survey conducted by Turkish Statistical Institute (2012) has revealed that 47% of households have access to the Internet at home with regular daily-basis use. Internet use of individuals aged between 16 and 74 were 37.8% and the proportion of computer

and Internet usage in 16–24 age group was the highest (Turkish Statistical Institute, 2012).

While the use of Internet is wide and increasing, the psychological problems related to maladaptive Internet use has been frequently reported in the literature, especially among young people (Mazhari, 2012). The phenomenon has been called under different names such as computer addiction, compulsive Internet use, internetomania, problematic or pathological Internet use, and last but not least Internet addiction (IA) (Young and Rogers, 1998; Davis, 2001; Shapira et al., 2003; Meerkerk et al., 2009; Ko et al., 2012). The incidence rate of the IA among high school students and university students in Turkey was 11.6% (Canan et al., 2010) and 12.26% (Kayri and Gunuc, 2009), respectively. It was suggested that individuals with IA can lose their control on the Internet use resulting impairments in daily functioning, relationships and emotional stability (Young and Rogers, 1998; Anderson, 2001; Davis, 2001; Ko et al., 2012). However, the underlying mechanisms of the phenomenon have not been clearly defined and there has been lack of diagnostic classification for IA in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) (American Psychiatric

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Association, 2000). Nevertheless, the clinical features of IA have been described in various ways (Young, 1996; Ko et al., 2012).

The description of IA has been constructed from the features of both substance dependence (Anderson, 2001) and pathological gambling (PG) (Young, 1996). It was suggested that the shared characteristics of IA with substance dependence and PG are related to preoccupation, mood modification, tolerance, withdrawal, and functional impairment (Hall and Parsons, 2001; Cao et al., 2007). Moreover whether the phenomenon is an impulse control disorder (ICD) or a behavioral addiction (BA) has still been a debate (Young, 1996; Hollander and Evers, 2001; Ko et al., 2012). The proponents of the ICD stated that IA is a new subtype of ICD (Treuer et al., 2001), which can be classified by considering the diagnostic criteria for ICD as stated in DSM-IV-TR (American Psychiatric Association, 2000). On the other hand, since the neurobiological pathway of IA was found to be different than ICD, others suggested that it is more appropriate to classify excessive Internet use as a BA (Holden, 2001; Van Holst et al., 2010).

1.2. Internet addiction and psychopathology

Although the IA was considered as a separate disorder (Fu et al., 2010), the excessive Internet use is also comorbid with other psychological symptoms and psychiatric disorders (Ko et al., 2012). Yen et al. (2008) suggested four mechanisms to account for the association between IA and psychiatric symptoms. First, psychiatric symptoms may lead to the onset or persistence of IA. Second, IA may precipitate psychiatric symptoms. Third, IA and psychiatric symptoms may increase vulnerability to each other. Finally, the shared risk factors, either genetic or environmental, may lead to the onset or persistence of psychiatric symptoms and IA. The IA has been found to be associated with attention-deficit hyperactivity disorder (Yen et al., 2007; Carli et al., 2013), low self-esteem (Kim and Davis, 2009), shyness (Treuer et al., 2001), depressive symptoms (Young and Rogers, 1998; Treuer et al., 2001; Ha et al., 2007; Jang et al., 2008), hostility (Ko et al., 2007; Yen et al., 2007), interpersonal sensitivity (Ko et al., 2007), impairments in relationships (Milani et al., 2009), obsessive-compulsive symptoms (OCS) (Ha et al. 2007; Jang et al., 2008; Carli et al., 2013), and last but not least impulsivity (Cao et al., 2007; Mazhari, 2012). Furthermore, the students who reported excessive internet use are characterized by complaints of indecisiveness, preoccupation with details, nervousness, irritability, aggressiveness, and impulsivity (Yang et al., 2005). Other than severity of psychopathology measured with the Symptom Checklist-Revised (SCL-90-R) being higher (Yang et al., 2005; Yen, et al., 2008), personality disorders, particularly those in cluster B known as impulsive personalities, found to be higher in those with IA (Yang et al., 2005).

1.3. Internet addiction and obsessive-compulsive symptoms

The previous studies demonstrated OCS to be associated with severity of IA (Ha et al. 2007; Jang et al., 2008; Carli et al., 2013). Among subscales of SCL-90-R, the severity of OCS was the highest among those with IA (Yang et al., 2005). Obsession is defined as repetitive thoughts (American Psychiatric Association, 2000), whereas compulsivity is defined as actions that are persistently repeated, despite adverse consequences (Robbins et al., 2011). Similarly, impulsivity is characterized by the tendency to act prematurely, without foresight, despite adverse consequences (Robbins et al., 2011). Therefore, some authors argued that impulsivity and compulsivity do not simply lie at opposite ends of a phenomenological and neurobiological spectrum, but rather have a complex intersection (Stein et al., 1996). According to the most recent review (Robbins et al., 2011), impulsive-compulsive tendencies should not be limited to substance abuse and obsessive

compulsive disorder, given the growing acceptance of the existence of such BA's as gambling, eating, sexual and IA.

1.4. Internet addiction and impulsivity

The impulsivity has been defined as a predisposition toward unplanned reactions toward internal or external stimuli without regarding the negative consequences of the action (Moeller et al., 2001). It was also suggested that the impulsivity is more salient in particular psychiatric disorders (Hollander and Evers, 2001) such as personality disorders, eating disorders (Loxton and Dawe, 2001), ICDs, substance abuse (Evenden, 1999; Dawe et al., 2004), PG (Lai et al., 2011), and last but not the least IA (Cao et al., 2007; Mazhari, 2012). A previous study found that adolescents with IA exhibit higher impulsivity than controls and have various comorbid psychiatric disorders, which could be associated with IA (Cao et al., 2007).

For those with behavioral inhibition problems, the Internet may serve as an area in which individuals can receive short-term rewards through gaming, surfing or social networking, and be reinforced by immediate gratification (Hall and Parsons, 2001). A previous study suggested that the impulsivity can be considered as an endophenotype of addictive behaviors (Verdejo-Garcia et al., 2008). Consistent with this, recent literature findings consistently supported the relationship between impulsivity and IA. For example, Mazhari (2012) stated that those with IA also had higher impulsivity. Moreover, Lee et al. (2012) revealed that those with IA showed increased levels of trait impulsivity than patients with PG and the severity of IA was associated with the level of trait impulsivity in patients with IA. The authors even suggested that the trait impulsivity could be a marker for vulnerability to IA (Lee et al., 2012).

Regarding the literature, the previous studies have investigated the relationship of IA with impulsivity (Cao et al., 2007; Mazhari, 2012) and psychopathology (Yang et al., 2005; Yen et al., 2008; Koç, 2011) separately. The aim of the study was to investigate the relationship of IA severity with psychopathology and impulsivity among Turkish university students. We also wanted to control the effect of impulsivity dimensions on the relationship between IA and psychopathology. The hypotheses of the present study were that while the severity of IA will be related with the severity of both impulsivity and psychopathology when they are considered separately, whereas the importance of impulsivity may emerge relative to the psychopathology dimensions when they are considered together.

2. Methods

The study was conducted with volunteers from two rather conservative universities in Ankara between December 2011 and May 2012. The Fatih University Faculty of Medicine Ethics Committee approved the study. Written informed consent was obtained from the students after the study protocol was thoroughly explained.

2.1. Participants

Five hundred university students from two universities in Ankara were randomly selected for the present study. The inclusion criteria were to use internet for communicative purposes on a regular basis and willingness to participate in the study. The excluding criteria were refusing to participate in the study, wanting any fee, leaving some parts of the scales unfilled, and not giving the forms back. Sixty-four of them refused to participate in the study because they did not have enough time and there was no

fee, and 82 students withdrew from study because of the forms being overly long. Thirty five students were excluded because of incomplete or unreturned forms. Thus, a total of 319 university students (85 males and 234 females) participated in the study. Among 181 students that excluded from the study or refuse to participate 74.6% ($n=135$) were male.

2.2. Assessments

All students were assessed by using a semi-structured socio-demographic form and scales. The questionnaires were completed by students in a classroom setting via paper-and-pencil format.

2.2.1. Internet Addiction Scale (IAS)

IAS was developed by Nichols and Nicki (2004) to measure the severity of IA and tested on a group of 233 college students. Cronbach's α of the IAS was 0.95, and the explained variance was 46.50%. The IAS is scored by summing the Likert responses across the 31 items. The authors suggested a cut-off score of 93 (3×31 items) as indicative of possible IA. In a reliability and validity study of the Turkish version of the IAS (Kayri and Gunuc, 2009), Cronbach's α value was 0.93 in 253 university students. In this study (Kayri and Gunuc, 2009), item four was deleted from the scale because the item-total correlation was 0.146. In the present study, which was conducted on 319 university students, the item-total correlation for item four was 0.337, whereas the lowest item-total correlation was 0.208 for item 29. Item 29 also had the lowest correlation (0.332) after deleting item four in the adaptation study of the Turkish version (Kayri and Gunuc, 2009). In the present study, item-total correlations ranged between 0.208 and 0.712, and Cronbach's α (0.94) did not differ when any of the items were deleted. Thus, Kayri and Gunuc's (2009) original 31-item Turkish version of the scale was used in the present study.

Kayri and Gunuc (2009) suggested the classification of scores into five groups: 30–60, 61–70, 71–80, 81–89 and > 90 . They also suggested that those who score 90 or higher should be considered as addicted to the Internet and that those who score between 81 and 89 should be considered as at high risk of IA. In the present study, the participants were differentiated into three groups according to IAS score, namely, moderate/high severe IA (IA or high risk group with cut off score of 81), mild severe IA (score ranging between 61 and 80) and group without IA (score ranging between 30 and 60). According to this grouping, rates of those with moderate/high IA, with mild IA and without IA was 12.2 ($n=39$), 25.7 ($n=82$) and 62.1 ($n=198$), respectively.

2.2.2. Barratt Impulsiveness Scale (BIS-11)

The BIS-11 is a 30-item self-report questionnaire which was designed to measure impulsiveness. It was suggested that three factors were determined: attentional impulsiveness, motor impulsiveness and non-planning impulsiveness (Patton et al., 1995). In the present study, the Turkish version of BIS-11 was used to examine impulsivity (Gulec et al., 2008).

2.2.3. 90-Item Symptom Checklist-Revised (SCL-90-R)

SCL-90-R is a self-report measure (Derogatis, 1983) used to assess psychopathologic symptoms. It has 90 items rated with a 5-point Likert scale (1, *no problem* to 5, *very serious*) to assess the extent to which individuals have experienced the listed symptoms in the last 7 days. These 90 items were grouped into nine subscales, namely, somatization, obsessive compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation and psychoticism. It was suggested that the higher the scores on SCL-90-R is, the higher the psychological

distress that the individual has experienced. In the present study, the Turkish version of SCL-90-R was used (Dag, 1991).

2.3. Statistical analysis

Group differences in demographic variables were computed through chi-square test. In order to compare groups regarding psychopathology and impulsivity, One-way ANOVA was used. To test the relationship of IAS with BIS-11 and SCL-90-R, Pearson's correlations were used. Linear regression model was used to determine the subscales of SCL-90-R that predict severity of IA. Lastly, two Hierarchical Linear regression models were used to determine the predictors of IAS score. In the first model BIS-11 total score was taken as an independent variable in the first step, whereas subscales of SCL-90-R were taken as independent variables in the second step. In the second model subscales of the BIS-11 were taken as independent variables in the first step, whereas subscales of SCL-90-R were taken as independent variables in the second step.

3. Results

Among the university students participated in the present study, 39 (12.2%) of them were categorized into the moderate/high severe IA group, 82 (25.7%) were categorized into the mild-severe IA group, and lastly 198 (62.1%) were categorized into the group without IA. The rate of membership in the moderate/high severe IA group was higher in males (20%, $n=17$) than females (9.4%, $n=22$) ($\chi^2(2)=7.28$, $p < 0.05$) (not shown).

Among impulsivity dimensions only motor impulsiveness (12.97 ± 3.18 in males, 12.21 ± 2.77 in females, $t=2.06$, and $p=0.041$) was higher in males than in females, whereas among SCL-90 dimensions only OCS (0.96 ± 0.69 in males, 1.23 ± 0.72 in females, $t=-3.00$, and $p=0.003$) and interpersonal sensitivity (0.85 ± 0.78 in males, 1.09 ± 0.78 in females, $t=-2.36$, and $p=0.019$) were higher in females than in males (not shown).

Results revealed that impulsivity and psychopathology scores were the highest in the moderate/high IA group than non-IA group. The moderate/high IA group also showed higher scores than the mild IA group for psychoticism, BIS-11, attentional and motor impulsiveness, whereas mild IA group indicated higher scores than the non-IA group for impulsivity scores and for most of the psychopathology dimensions, but not for anxiety, phobic anxiety and psychoticism (Table 1). Correlational analysis revealed that IAS was positively correlated with impulsivity and psychopathology scores (Table 2).

In linear regression model when IAS score was taken as dependent variable and subscales of SCL-90-R were taken as independent variables, OCS was the only predictor ($B=8.36$, $SE=1.33$, $\beta=0.33$, $t=6.30$, $p < 0.001$, $F=39.73$, $df=1.32$, $p < 0.001$, $Adjusted R^2=0.11$) (not shown).

Two Hierarchical Linear regression models were used to determine the predictors of IAS score. In the first model, impulsivity total score was entered as independent variable in step 1 and dimensions of SCL-90-R in step 2. The results revealed that impulsivity predicted the IAS in the first step. In the second step, beside the impulsivity, interpersonal sensitivity was found to be the only predictor of IAS (Table 3). In second model, impulsivity dimensions were entered as independent variables in step 1 and dimensions of SCL-90-R in step 2. The results revealed that both attentional and motor impulsiveness predicted the IAS in the first step. In the second step, beside these impulsivity dimensions, interpersonal sensitivity was found to be the only predictor of IAS (Table 3).

Table 1
Comparing BIS-11 and SCL-90-R scores according to the groups.

	IAS scores			F (df=2.316)	p
	Without IA 30–60 (n=198) (mean ± S.D.)	Mild IA 61–80 (n=82) (mean ± S.D.)	Moderate/high IA 81–highest (n=39) (mean ± S.D.)		
Attentional impulsiveness ^a	14.86 ± 3.05	16.60 ± 3.34	19.21 ± 3.41	33.76	< 0.001
Motor impulsiveness ^a	18.54 ± 3.81	20.05 ± 3.65	23.79 ± 4.54	30.96	< 0.001
Non-planning impulsiveness ^b	23.11 ± 4.41	25.37 ± 4.54	26.72 ± 3.63	15.59	< 0.001
BIS-11 ^a	56.51 ± 8.86	62.01 ± 9.43	69.72 ± 9.26	38.76	< 0.001
Somatization ^b	0.67 ± 0.58	0.87 ± 0.67	1.03 ± 0.72	7.01	0.001
Anxiety ^c	0.59 ± 0.58	0.76 ± 0.59	0.98 ± 0.74	8.01	< 0.001
Obsessive-compulsive ^b	1.00 ± 0.67	1.32 ± 0.70	1.60 ± 0.78	15.40	< 0.001
Depression ^b	0.75 ± 0.74	1.01 ± 0.67	1.28 ± 0.83	10.37	< 0.001
Interpersonal sensitivity ^b	0.87 ± 0.74	1.16 ± 0.72	1.50 ± 0.91	12.91	< 0.001
Psychoticism ^d	0.53 ± 0.56	0.66 ± 0.55	0.99 ± 0.71	11.07	< 0.001
Paranoid ideation ^b	0.80 ± 0.70	1.09 ± 0.77	1.22 ± 0.85	8.22	< 0.001
Hostility ^b	0.62 ± 0.68	0.86 ± 0.79	1.16 ± 0.86	10.42	< 0.001
Phobic anxiety ^c	0.39 ± 0.54	0.52 ± 0.52	0.75 ± 0.74	7.16	0.001
Global Severity Index ^b	0.70 ± 0.56	0.93 ± 0.55	1.17 ± 0.68	13.06	< 0.001

^a Moderate/high IA > mild IA > without IA.

^b Moderate/high IA, mild IA > without IA.

^c Moderate/high IA > without IA.

^d Moderate/high IA > mild IA, without IA.

Table 2
Correlations between the IAS, BIS-11 and SCL-90-R scores.

	IAS score	Attentional impulsiveness	Motor impulsiveness	Non-planning impulsiveness	BIS-11
Internet Addiction Scale (IAS) score	–	0.39 ^a	0.38 ^a	0.28 ^a	0.42 ^a
Somatization	0.23	0.34 ^a	0.13	0.10	0.22
Anxiety	0.23	0.38 ^a	0.17	0.11	0.25 ^a
Obsessive-compulsive	0.33 ^a	0.45 ^a	0.17	0.24	0.33 ^a
Depression	0.28 ^a	0.39 ^a	0.15	0.12	0.25 ^a
Interpersonal sensitivity	0.32 ^a	0.38 ^a	0.10	0.17	0.25 ^a
Psychoticism	0.26 ^a	0.38 ^a	0.23	0.14	0.29 ^a
Paranoid ideation	0.25 ^a	0.33 ^a	0.17	0.14	0.25 ^a
Hostility	0.30 ^a	0.38 ^a	0.23	0.14	0.29 ^a
Phobic anxiety	0.24	0.33 ^a	0.17	0.13	0.24
Global Severity Index	0.31 ^a	0.43 ^a	0.19	0.16	0.30 ^a

^a p < 0.001.

4. Discussion

The present study found that university students with IA demonstrated higher scores on all of BIS-11 and SCL-90-R subscales than those without IA and most of the subscales were associated with the severity of IA. Consistent with these, IA has been suggested to be associated with many psychiatric disorders (Ha et al., 2006; Ko et al., 2012) and symptoms (Yang et al., 2005; Yen et al., 2008; Lee et al., 2012; Carli et al., 2013). In a previous study, Turkish university students with IA had higher scores for somatization, OCS, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation and psychoticism than those without IA (Koç, 2011). One of important findings of the present study was that when dimensions of SCL-90-R were entered as independent variables, only OCS predicted severity of IA. However when these dimensions were entered in hierarchical

Table 3
Hierarchical linear regression model when IAS score was taken as dependent variable.

	Unstandardized coefficients		Standardized coefficients	t	p
	B	Std. error	Beta		
Model 1					
Step 1					
(Constant)	14.679	5.515		2.662	0.008
BIS-11	0.754	0.091	0.421	8.256	< 0.001
Step 2					
(Constant)	15.386	5.361		2.870	0.004
BIS-11	0.652	0.092	0.364	7.119	< 0.001
Interpersonal sensitivity	5.222	1.176	0.227	4.442	< 0.001
Model 2					
Step 1a					
(Constant)	27.790	4.353		6.384	< 0.001
Attentional impulsiveness	2.007	0.268	0.387	7.476	< 0.001
Step 1b					
(Constant)	18.809	4.836		3.889	< 0.001
Attentional impulsiveness	1.297	0.319	0.250	4.067	< 0.001
Motor impulsiveness	1.033	0.264	0.241	3.916	< 0.001
Step 2					
(Constant)	19.041	4.699		4.052	< 0.001
Attentional impulsiveness	0.711	0.337	0.137	2.111	0.036
Motor impulsiveness	1.209	0.259	0.282	4.660	< 0.001
Interpersonal sensitivity	5.492	1.236	0.239	4.445	< 0.001

Model 1: Variable entered in the first step: BIS-11. Step 1: F=68.16, df=1.317, p < 0.001, and Adjusted R²=0.174. Variables entered in second step: Subscales of SCL-90, Step 2: F=45.96, df=2.316, p < 0.001, Adjusted R²=0.220, and R² change=0.048.

Model 2: Variables entered in the first step: Subscales of BIS-11. Step 1a: F=55.89, df=1.317, p < 0.001, Adjusted R²=0.147, and R² change=0.150. Step 1b: F=36.87, df=2.316, p < 0.001, Adjusted R²=0.184, and R² change=0.039. Variables entered in second step: Subscales of SCL-90, Step 2: F=32.63, df=3.315, p < 0.001, Adjusted R²=0.230, and R² change=0.048.

regression model after impulsivity dimensions, only interpersonal sensitivity predicted the severity of IA additional to attentional and motor impulsiveness. Thus, the association of impulsivity with IA seems to be more prominent than the association between IA and psychopathology. Nevertheless, although severity of IA was related with impulsivity and psychiatric symptoms in the present study, because of the cross-sectional design, it was not possible to make conclusive statements about the temporal order between the measures of psychiatric symptoms and IA.

Previous studies suggested IA to be related with OCS (Yang et al., 2005; Ha et al. 2007; Jang et al., 2008; Carli et al., 2013). Consistent with this, the present study also revealed that, among SCL-90-R dimensions, which were all related with severity of IA, only OCS predicted IA severity in university students. Although two different behaviors, impulsivity and compulsivity, can lead to similar results, and suggested to be common features of all types of addictions (Koob, 2009). That is, addiction can be conceptualized as a disorder that progresses from impulsivity (positive reinforcement) to compulsivity (negative reinforcement) (Koob, 2009). Those with impulsive-compulsive tendencies may be less able to control their use of the Internet (Meerkerk et al., 2009; Meerkerk et al., 2010). Consistent with this, in the present study, severity of IA, impulsivity and OCS were all associated with each other. Nevertheless, in the present study, the results suggested that impulsivity was a better predictor for IA than the OCS. Consistent with previous findings (Cao et al., 2007; Mazhari, 2012), attentional and motor impulsiveness were the significant predictors of IA. The impulsivity was found more salient in some of the psychiatric disorders (Hollander and Evers, 2001), an essential shared feature with ICDs (Lee et al., 2012) and different types of addictions (Evenden, 1999; Dawe et al., 2004; Ko et al., 2007; Ko et al., 2008a, 2008b; Evren et al., 2012). Since those with impulsivity are less able to control their use of the internet, impulsivity may be considered as a risk factor for the development of IA (Meerkerk et al., 2010) and as an endophenotypic feature in addictions (Verdejo-Garcia et al., 2008). However, since the present study was a cross-sectional one, further studies are required to understand the causal relationship between impulsivity and the severity of IA.

Interpersonal sensitivity was also a predictor of IA severity additional to impulsivity dimensions. In a previous study, adolescents with excessive computer use had highest scores for OCS, followed by interpersonal sensitivity (Yang, 2001). Consistent with this, a study found that low interpersonal sensitivity may predict the remission of IA (Ko et al., 2007). In addition, Milani et al. (2009) reported that adolescents with symptoms of IA had worse interpersonal relationships. Impulsivity may have contribution on the impairment of interpersonal relationships, which may further cause withdrawal from real life relationships. Those with higher scores on interpersonal sensitivity have the feelings of inadequacy, inferiority and significant discomfort in interactions, self-deprecation and self-doubt. Also they are self-consciousness and have negative expectations about relationships (Derogatis, 1983). It is plausible that students with interpersonal sensitivity are drawn to electronic communication because of the anonymous cover granted to them, which helps them overcome real-life interpersonal difficulties. These results, however, do not clearly indicate whether interpersonal sensitivity preceded the development of IA or if it was a consequence. Indeed withdrawal from significant real-life relationships may be a consequence of IA. Consistent with this, a study that compared dimensions of SCL-90 before and after the development of IA found that OCS was the only dimension that was abnormal before the students became addicted to the Internet, whereas after their addiction, significantly higher scores were observed for dimensions on depression, anxiety, hostility, and interpersonal sensitivity suggesting that these were outcomes of

IA (Dong et al., 2011). It was also suggested that individuals with IA can lose their control on the Internet use resulting with impairments in daily functioning, relationships and emotional stability (Young and Rogers, 1998; Anderson, 2001; Davis, 2001; Ko et al., 2012). Therefore, further experimentation with a more comprehensive level of analysis is necessary to examine cause and effect. Nevertheless, at the minimum, the Internet can provide a zone with freedom to avoid social norms (Yang et al., 2005) and social contacts (Tonioni et al., 2012) to regulate their emotions (Young, 1996; Billieux et al., 2010) through a virtual self (Allison et al., 2006). Thus, the individuals with higher interpersonal sensitivity and impulsivity may find relief on the Internet.

Beside the OCS, interpersonal sensitivity and impulsivity, the literature findings emphasized other determinants of IA, namely, depressive symptoms (Jang et al., 2008; Carli et al., 2013) and hostility (Ko et al., 2007). While the depressive symptoms and the hostility were higher in the moderate/high IA group than the non-IA group and correlated with severity of IA in the present study, they did not predict severity of IA. The reason of why the current findings were different from the previous studies could be due to sample difference. That is, depressive disorders (Ko et al., 2008a, 2008b) and hostility (Yen et al., 2007) were found to be associated with IA among males but not females, and males were more likely to use Internet than females (Yen et al., 2007; Turkish Statistical Institute, 2012). Other than gender difference, conservatism can be essential in understanding the concept. Initially, while the positive relationship between IA and other addictions were found (Ko et al., 2008a, 2008b; Ko et al., 2012), the inverse association between conservatism and addictions has been reported (Charlton et al., 2012). Thus, being conservative and female dominance of the present sample may have affected the results. The reason why the nature of the sample ended up with this pattern is because of the fact that females more willingly and carefully completed the questionnaires (Ozcan and Sevim, 2005). Nevertheless, the findings were still consistent with the literature findings (Carli et al., 2013) that the rate of the moderate/high IA group was higher in males (20%) than females (9%). It can be concluded that the sample being female-dominant and relatively more conservative were the main limitations of the present study, which may restrict the generalizability of the results, and these issues are needed to be taken into consideration for future research. Nevertheless, the results should be interpreted with caution because only severity of three variables that also predicted severity of IA in the present study showed gender difference; motor impulsiveness was higher in males, whereas OCS and interpersonal sensitivity were higher in females. Finally, impulsive personality disorders were not evaluated in the present study, which can be considered as a limitation, since the findings of the previous study suggested that cluster B personality disorders may have highly represented in university students with IA (Yang et al., 2005).

In sum, the present study conducted among university students mainly emphasizes that IA was positively correlated with severity of psychopathology and impulsivity scores. Although the direction of causal relationship and the mediators have remained unclear, it can be concluded that the impulsivity, interpersonal sensitivity and OCS are the important predictors needed to be taken into account when considering IA and its treatment among Turkish university students. These variables may be considered as risk factors for maladaptive Internet use and IA among students who are already engaged with the Internet.

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