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Problematic Internet use among Turkish university students: A multidimensional investigation based on demographics and Internet activities

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Abstract
This study investigates the Turkish undergraduate university students' problematic Internet use (PIU) levels on different dimensions based on demographics (e.g., gender, Internet use by time of day), and Internet activities (e.g., chat, entertainment, social networking, information searching, etc.).Moreover, the study explored some predictors of PIU on different dimensions among the Turkish undergraduate students (N=610). The results indicate that the female students (N=358) had significantly lower PIU levels on all dimensions (i.e., social comfort, loneliness/depression, diminished impulse control and distraction) than those of the males (N=252). Furthermore, the results reveal that the students who use the Internet for entertainment (e.g., game) chat and social networking purposes have significantly higher PIU levels on all dimensions than the students who do not use the Internet for such purposes. However, the students who use the Internet for educational purposes have a significantly lower PIU level on distraction dimension, and the students who use the Internet for information searching demonstrate a significantly lower PIU level on the dimension of diminished impulse control. Moreover, multiple regression analyses reveal that Internet activities such as chat, entertainment and social networking are significant predictors of the all dimensions of PIU.

Keywords: Problematic Internet use, Internet activities, Gender, Turkish university students, Predictors

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INTRODUCTION

The Internet, as a medium of information and communication, has an important place in social and academic life of university students in many societies (Munoz & Towner, 2009; Kirschner & Karpinski, 2010; Ceyhan, 2008). Rosen (2007) calls students, born in 1980s and 1990s, as the net generation. According to Rosen, the students of net generations are master multitaskers, social networkers, electronic communicators and the first to rush to any new technology. However, while the Internet has become a major information and communication medium for the students, the number of unhealthy or excessive Internet users among them has also grown remarkably (Li, Wang, & Wang, 2009; Zhu & Wu, 2004; Frangos, Frangos, & Sotiropoulos, 2010; Ceyhan, 2008; Kirschner, & Karpinski, 2010). According to the literature (e.g., Morahan-Martin & Schumacher 2000; Beard & Wolf, 2001), the excessive Internet use can be associated with problematic Internet use (PIU) that causes problems in psychological and social lives of individuals as well as difficulties at school and work (Li, Zhang, Li, Zhen & Wang, 2010; Kim, LaRose, & Peng, 2009). Davis, Flett, and Besser (2002) discuss that PIU is more than merely spending too much time online, and it has multiple dimensions (i.e., social comfort, loneliness/depression, diminished impulse control and distraction) based on their investigation about association between various cognitive and behavioral variables. Similarly, Caplan (2005) considers PIU as a, "multidimensional syndrome consisting of cognitive and behavioral symptoms that result in negative social, academic, or professional consequences" (p. 721).

A growing body of research has investigated the nature of PIU among university students (e.g., Davis, et al., 2002; Caplan, 2005; Kim et al., 2009, Frangos et al., 2010). The related literature (Morahan-Martin & Schumacher 2000; Li, & Chung, 2006; Charlton & Danforth 2007; Frangos et al., 2010) regarding the relationship between PIU and Internet activities points that real-time interactive activities (e.g., chat lines, online games) and social uses of the Internet are positively associated with the PIU levels of the students. On the other hand, it has not been so clear whether the PIU levels of the students can be associated (positively or negatively) with other Internet activities (e.g., news reading, online shopping, reading electronic papers, etc.) on different dimensions of PIU (i.e., social comfort, loneliness/depression, diminished impulse control and distraction). Moreover, there are still some controversy particularly about gender issue in the PIU literature (e.g., Morahan-Martin,

& Schumacher, 2000; Li, Wang, & Wang, 2009). Furthermore, although some studies have been emerging (e.g., Ceyhan, 2008), PIU among the Turkish university students based on various Internet activities has not been sufficiently investigated, and the current understanding of why Turkish university students differ in their PIU is still limited. Thus, this study concentrates on PIU of Turkish undergraduate students at a medium-size university in the North West Black Sea Region of Turkey. Specifically, the study focuses on whether there are any differences in the Turkish undergraduate students' levels of PIU on different dimensions according to the Internet activities, Internet use by time of day, and gender. Additionally, this study investigates some predictors of PIU on different dimensions among the Turkish undergraduate students.

Internet Activities and PIU

Scholars (e.g., Morahan-Martin, & Schumacher, 2000; Davis et al., 2002; Caplan, 2005; Ceyhan, 2008; Frangos et al., 2010) from different nations have been interested in whether factors, predictors and levels of PIU differ among the college or university students depending on Internet activities. According to the related literature, the Internet activities which are positively associated with the level of PIU are real-time interactive activities (e.g., chat lines, online games) and social networking tools (Morahan-Martin & Schumacher 2000; Li, & Chung, 2006; Charlton & Danforth 2007; Frangos et al., 2010). For instance, a study about online games in Taiwan showed that the quality of interpersonal relationships decreased and the amount of social anxiety increased as the amount of time spent playing online games increased among college-age online players (Lo, Wang & Fang, 2005). Also, Davis et al. (2002) study reveals that e-mail and web-surfing are less problematic than the interactive applications (e.g., chat, instant messaging). In addition, Ceyhan's study (2008) indicates that PIU levels of the students, whose primary reason is to communicate with their relatives and to have fun, are significantly higher than those of the students who use it to gather information about a topic. Thus, chat, online games and social networking can be considered as problematic activities, based on the literature. However, it is not clear whether other Internet activities (e.g., news reading, online shopping, and reading electronic papers) are associated with PIU on different dimensions.

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Internet use by time of day and PIU

According to the literature (e.g., Kubey, Lavin & Barrows, 2001; Ceyhan, 2008) university students who use the Internet at night are more likely to be unhealthy and problematic Internet users. Kubey et al. discuss that excessive Internet users usually stay up late, get less sleep, feel tired and have impaired academic performance. In addition, Ceyhan's findings indicate that PIU levels of the Turkish university students who use the Internet mostly at night are notably higher than those of the students who use it in daytime. However, the Internet activities of the Turkish students who use it at night have not been sufficiently investigated. Moreover, whether the students' PIU levels on different dimensions differ according to their Internet uses in particular time zones of a day (i.e., 08.00-11.59 am, 12.00-15.59 pm, 16.00-19.59 pm, 20.00-23.59 pm, 00.00-03.59 am) are not sufficiently clear.

Gender and PIU

Majority of the prior literature (e.g., Ceyhan, 2008; Shaw & Black, 2008; Chou, Condron, & Belland, 2005; Morahan-Martin, & Schumacher, 2000) regarding the PIU and gender issue reveals that males are more likely to be involved in PIU than females. However, some of the literature (e.g., Davis et al. 2002; Li at al. 2009) points that there are no gender differences in the PIU levels of the college students. Li et al. (2009) speculate that the gender difference in PIU is mostly dependent on the type of Internet activity. As a result, it seems that this area has not been investigated clearly enough to define the relationship between gender and PIU.

Country Profile

With a population of about 73 million, Turkey has the demographics of a developing country with a GDP/capita of around US$5.000 (Business Monitor International, 2008). The Internet penetration rate in Turkey (23% in 2008) can be considered low in comparison to the penetration rate (50% in 2008) in western European Union countries. Nonetheless, the Internet penetration rate in Turkey has raised with the introduction of a number of campaigns to boost Internet penetration in education and other sectors (Business Monitor International, 2008). According to the statistics about Internet use in Turkey, more than 19.7 million people aged 15 and older accessed the Internet from home or work location in September, 2009. As a result, the Internet penetration rate in the Turkey has raised up to about 27 percent

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(N=19.7 million users out of 73 million) based on the more recent statistics (Tech 24 Hours - A Technology Magazine, 2009).

Purpose of the Study

The purpose of the study is to investigate whether there are any differences in the Turkish undergraduate students' levels of PIU on different dimensions based on Internet activities, gender and Internet use by time of day. Moreover, this study investigates some predictors of PIU on the Turkish university students. Specifically, this study explores the following research questions:

1. Are there any significant differences in the students' levels of PUI on four dimensions (i.e., social comfort, loneliness/depression, diminished impulse control and distraction) based on the Internet activities (i.e., educational Internet use, information search through search engines, e-mail, chat, entertainment, news reading, social networking, and online shopping)?
2. Are there any significant differences in the students' levels of PIU on the four dimensions according to the Internet use by time of day?

   Sub-research questions:

   a. Which mean scores significantly differ from other one(s) if there is any significant difference in the students' levels of PIU on the four dimensions based on Internet use by time of day?

   b. Are there any differences in the descriptive statistics (e.g., percentages, numbers) regarding the Internet activities of the students based on Internet use by time of day?

   c. Are there any significant differences in the Internet activities of the students based on Internet use by time of day?
3. Are there any significant differences in the students' levels of PIU on the four dimensions according to the gender?

   Sub-research question:

   a. Are there any significant differences in the internet activities of the students (i.e., educational Internet use, information search through search engines, e-mail, chat, entertainment, news reading, social networking, and online shopping) based on gender?

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4. What are the predictors of PUI on the four dimensions among the Turkish undergraduate students?

METHODOLOGY

Participants

The participants were undergraduate university students at Abant Izzet Baysal University, Turkey. The students at different faculties and schools at the university were asked randomly whether they want to participate in the research in Fall semester of 2009-2010 academic year. A sample of 705 undergraduate students was volunteers to fill out the questionnaire.

However, the data obtained from 95 students were excluded from the analyses since 68 students' responses on the questionnaire were incomplete and 27 students did not use the Internet regularly at least between 1-5 hours a week. Thus, the data gathered from 610 undergraduate students (358 females and 252 males) in different faculties or schools, such as the Faculty of Literature and Science (N = 109), the Faculty of Education (N = 209), the Faculty of Management and Business Administration (N = 191), the Faculty of Engineering (N=59) and the School of Physical Education and Sport (N = 42), were used in the analyses.

Research Instruments

A paper-and-pencil questionnaire consisting of two sections was used to collect data. The first section was used to gather demographic details (e.g., gender, age, school or faculty, Internet use by time of day, Internet usage frequencies, Internet activities). The second section of the questionnaire contains a Turkish version of the Online Cognition Scale (OCS) which is an assistive tool for multidimensional measure of PIU. The OCS, originally developed and validated by Davis et al. (2002), contains 36 items on a seven-point Likert scale with scores for each item ranging from one (strongly disagree) to seven (strongly agree). Also, the OCS consists of four dimensions: social comfort, loneliness/depression, diminished impulse control, and distraction. The Turkish version of the scale was validated in an earlier study conducted by Keser-Ozcan and Buzlu (2005). A confirmatory factor analyses indicated that scale in Turkish and original scale in English have consistent factorial structure (Keser-Ozcan and Buzlu, 2005). Thus, prior studies (Davis et al., 2002, Keser-

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Buzlu & Özcan, 2005) indicate that the OCS has sufficient factorial validity in determining the problematic Internet use.

Furthermore, the OCS was found to have high or sufficient internal consistency and reliability in the prior studies (Davis et al., 2002; Keser-Ozcan & Buzlu, 2005). For instance, Cronbach's alpha reliability coefficients (α) were found as 0.87, 0.77, 0.84, and 0.81 respectively for social comfort, loneliness/depression, diminished impulse control, and distraction dimensions and it was found as 0.94 for the entire scale. According to the findings of Keser-Ozcan and Buzlu, the reliability coefficients (α) were 0.84, 0.60, 0.79, and 0.73 respectively for social comfort, loneliness/depression, diminished impulse control, and distraction dimensions, and it was 0.91 for the entire scale. In the current study, the reliability coefficients (α) were found as 0.82, 0.74, 0.82, and 0.78 respectively for social comfort, loneliness/depression, diminished impulse control, and distraction dimensions, and it was found as 0.92 for the entire scale. As consistent with the prior studies (Davis et al., 2002, Keser-Buzlu & Özcan, 2005) the OCS in this study has high internal consistency as well. Also, the OCS was developed by using the data collected from undergraduate students (Davis et al., 2002), and the Turkish adaptation study was conducted among the undergraduate students in Turkey. Therefore, it can be stated that the scale is a convenient tool to measure problematic Internet use of the students in this study by considering its factorial validity, level of reliability, and similarity of the samples in prior studies (Davis et al., 2002, Keser-Buzlu & Özcan, 2005).

In addition, the four dimensions of the OCS or PIU are explained as the fallowing:

Social comfort*:** The social comfort dimension of PIU involves an adaptive function of loneliness rather than pathological. According to Davis et al (2002), people who are lonely tend to use the Internet for the purpose of social comfort. In other words, the Internet is used as a medium to reach out to others and increase a person's social network. Moreover, social comfort involves feelings of safety and security in being a part of that social network. ***Loneliness/depression: This dimension of PIU involves feelings of worthlessness and depressive cognitions related to the Internet. According to Davis et al. (2002), loneliness is strongly associated with PIU and depressive cognitions play an important role in exacerbating symptoms of PIU.

Diminished impulse control: Diminished impulse control regarding Internet use involves risk taking and dangerous behaviors which may be related to online gambling and engaging

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illegal activities online (e.g., sending viruses). In short, this dimension is associated with more severe problematic Internet use (Davis et al, 2002).

Distraction: Internet distraction involves using the Internet as an activity of avoidance. In general, individuals use the Internet in order to be distracted from a stressful event, task or stream of thought.

Data Collection and Data Analysis Procedures

The data analyses were carried out with the Statistical Packages for Social Sciences (SPPS) using multiple analyses of variance (MANOVA), multiple regression analyses with stepwise method, cross-tabulations, and chi-square tests. MANOVA is useful to test differences between groups (independent variable) using multiple dependent variables (Hair et al., 1998). The MANOVAs were performed to test the differences between categorical groups or independent variables (e.g., information searching through search engines, educational Internet use, e-mail, chat, entertainment, social networking, news reading, shopping, Internet use by time of day , and gender) on OCS subscales (dependent variables). Figure 1 presents the results for assumptions of normal distribution and Figure 2 presents linearity of the dependent variables for MANOVA. According to the results presented in the figures, it can be said the dependent variables have acceptable normal distribution within groups (see Figure 1), and there are sufficient linear relationships among all pairs of dependent variables (see Figure 2).

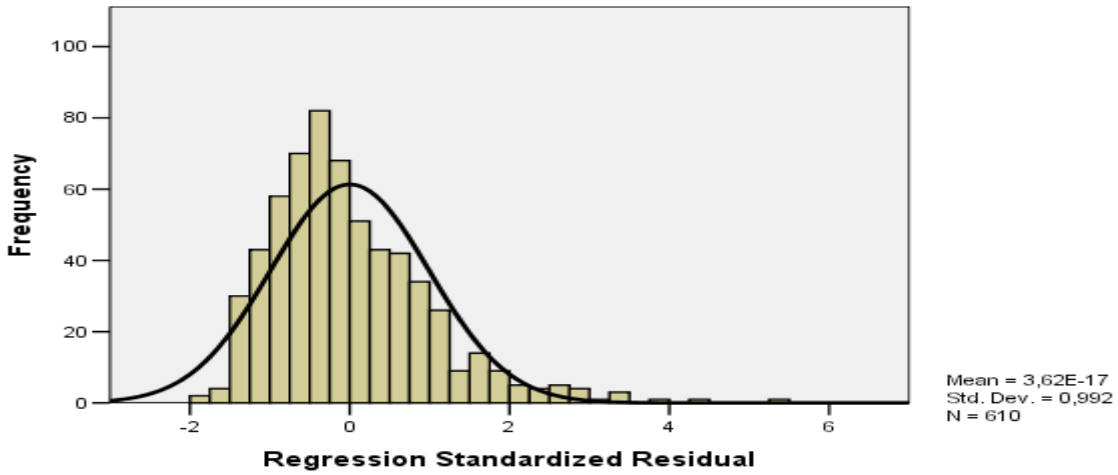

Figure 1. Normality of distributions of dependent variables.

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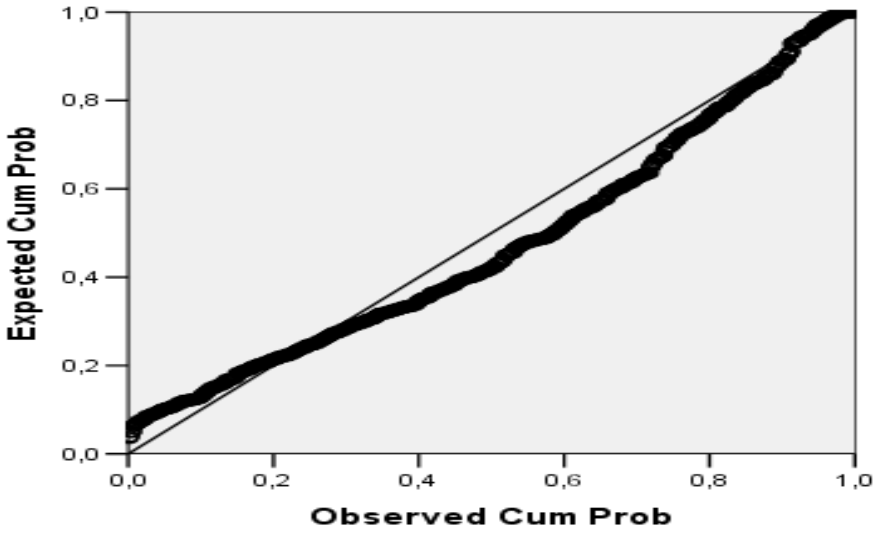

Figure 2. Linearity of dependent variables.

Multiple regression analyses were performed to test the simultaneous association of the four OCS subscales with each of the study variables and to predict the factors influencing the subscale or dimension scores of the PIU of the students. Cross-tabulations were used to get some descriptive statistics regarding Internet activities of the students. A chi square statistic is used to investigate whether distributions of categorical variables (i.e., internet activities) differ from one another based on time of day.

RESULTS

Results regarding Internet Activities

According to the responses of the participants, while 468 students have personnel computers (PC), 142 students do not have. Also, based on the data obtained from the participants, they have opportunities to access the Internet in their dorms or houses and the computer labs in the university. In addition, in general, 309 students use the Internet between 1-5 hours a week, 270 students use it between 1-5 hours a day, and 31 students use it more than 5 hours a day. Moreover, 13 participants have used the Internet for one year, 87 participants have used it for 2-3 years, 201 participants have used it for 4-5 years, 179 students have used it for 6-7 years, and 130 students have used it more than 7 years.

Based on the related literature and the data collected from the students (N=610), the main Internet activities concentrated in this study are *information searching through search engines* (N=541 out of 610), *educational Internet use (e.g., finding and reading electronic*

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educational papers) (N= 502), *e-mail* (N=491), *entertainment* (N=451), *chat* (N=313), *social networking (e.g., Facebook)* (N=393), *news reading* (N=457) and *online shopping* (N=121).

The MANOVAs were applied with categorical groups of Internet activities (i.e., information searching through search engines, educational Internet use, e-mail, chat, entertainment, social networking, news reading, shopping) as independent variables and the four dimensions of PIU as the dependent variables to answer the first research question.

Information Searching Through Search Engines

A big majority of the students (N=541 out of 610) use the search engines (e.g., Google) for information searching, whereas a small number of the students (N=69) do not use them for information searching.

Table 1: MANOVA results of the PIU Dimensions for Information Searching

Dimensions of PIU	Information Searching	N	Mean	SD	F
Social Comfort	Users	541	26.84	10.64	1.561
	Nonusers	69	28.56	11.78	
Loneliness/depression	Users	541	11.90	5.69	3.377
	Nonusers	69	13.26	6.40	
Distraction	Users	541	18.30	7.93	2.458
	Nonusers	69	19.91	8.69	
Diminished Impulse Control	Users	541	21.41	9.05	4.160
	Nonusers	69	23.84	11.21	

The MANOVA results in Table 1 show significant difference at $p<.05$ level on the dimension of diminished impulse control ($F [1,608] = 4.168$; $p=.042$) in favor of the students who use the search engines for information searching. On the other hand, no significant differences are found regarding the dimensions of social comfort, loneliness/depression and distraction.

Educational Internet Use

The descriptive results in Table 2 indicates that 502 students out of 610 use the Internet for educational purposes such as finding and reading electronic educational papers, whereas 108 students have not used it for educational purposes. According to the MANOVA results, there is a significant difference at $p<.05$ level on the distraction dimension of PIU ($F [1,608] = 5.097$; $p=.024$) in favor of the educational Internet users whose PIU mean score is

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notably lower than that of the nonusers. However, the results indicate no significant differences on the dimensions of social comfort, loneliness/depression, and diminished impulse control.

Table 2: The MANOVA results of the Dimensions of PIU for Educational Internet Use

Dimensions of PIU	Educational Internet Use	N	Mean	SD	F
Social Comfort	Users	502	27.01	10.81	.019
	Nonusers	108	27.16	10.68	
Loneliness/depression	Users	502	11.95	5.71	.833
	Nonusers	108	12.51	6.12	
Distraction	Users	502	18.14	8.03	5.097
	Nonusers	108	20.06	7.88	
Diminished Impulse Control	Users	502	21.37	9.31	3.187
	Nonusers	108	23.13	9.37	

E-Mail Use

While more students (N=491 out of 610) use e-mail for communication purposes, less students (N=119) do not use it. A MANOVA was applied with e-mail use as the independent variable and the four dimensions of PIU as the dependent variables. As displayed in Table 3, the results indicate no significant differences at $p<.05$ level concerning any of the four PIU dimensions.

Table 3: The MANOVA results of the PIU Dimensions for E-Mail Use

Dimensions of PIU	E-mail	N	Mean	SD	F
Social Comfort	Users	491	26.85	10.57	.784
	Nonusers	119	27.82	11.64	
Loneliness/depression	Users	491	12.03	5.75	.039
	Nonusers	119	12.15	5.94	
Distraction	Users	491	18.47	7.88	.003
	Nonusers	119	18.52	8.65	
Diminished Impulse Control	Users	491	21.63	9.15	.071
	Nonusers	119	21.89	10.11	

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Entertainment

According to the descriptive results in Table 4, 451 students out of 610 use the Internet for entertainment purposes (e.g., game), while 159 students do not use it. The MANOVA results show significant difference at p<0.5 level for all dimensions (i.e., social comfort (F [1,608] = 12.088; p=.001); loneliness/depression (F [1,608] = 10.857; p=.001); distraction (F [1,608] = 19.340; p=.000); and diminished impulse control (F [1,608] = 18.971; p=.000)) in favor of the nonusers of the Internet for entertainment (e.g., game) purposes.

Table 4: The MANOVA results of the PIU Dimensions for Entertainment

Dimensions of PIU	Entertainment Use of Internet	N	Mean	SD	F
Social Comfort	Users	451	27.93	10.97	12.088
	Nonusers	159	24.50	9.84	
Loneliness/depression	Users	451	12.51	5.91	10.857
	Nonusers	159	10.76	5.22	
Distraction	Users	451	19.32	8.15	19.340
	Nonusers	159	16.11	7.19	
Diminished Impulse Control	Users	451	22.64	9.35	18.971
	Nonusers	159	18.94	8.78	

Chat

While more than half of the students (N=313 out of 610) use the Internet for chat purposes, less number of the students (N=297) do not use it. The MANOVA results in Table 5 indicate significant differences at p<.05 level for all dimensions (i.e., social comfort (F [1,608] = 20.264; p=.000); loneliness/depression (F [1,608] = 10.343; p=.001); distraction (F [1,608] = 23.344; p=.000); and diminished impulse control (F [1,608] = 22.129; p=.000)) in favor of the nonusers of chat services.

Table 5: The MANOVA results of the PIU Dimensions for Chat

Dimensions of PIU	Chat	N	Mean	SD	F
Social Comfort	Users	313	28.92	11.04	20.264
	Nonusers	297	25.05	10.15	
Loneliness/depression	Users	313	12.78	6.14	10.343
	Nonusers	297	11.28	5.28	
Distraction	Users	313	19.99	8.16	23.344
	Nonusers	297	16.90	7.58	
Diminished Impulse Control	Users	313	23.38	9.70	22.129
	Nonusers	297	19.88	8.60	

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Social Networking

The descriptive results in Table 6 indicate that 393 students use social networking tools (e.g., Facebook) and 217 students do not use them. The MANOVA results show significant differences at p<.05 level for all dimensions (i.e., social comfort (F [1,608] = 9.097; p=.03); loneliness/depression (F [1,608] = 15.881; p=.000); distraction (F [1,608] = 11.012; p=.001); and diminished impulse control (F [1,608] =29.407; p=.000)) in favor of the nonusers of social networking tools.

Table 6: The MANOVA results of the PIU Dimensions for Social Networking

Dimensions of PIU	Social Networking	N	Mean	SD	F
Social Comfort	Users	393	28.01	10.94	9.097
	Nonusers	217	25.27	10.29	
Loneliness/depression	Users	393	12.74	5.95	15.881
	Nonusers	217	10.81	5.26	
Distraction	Users	393	19.28	8.07	11.012
	Nonusers	217	17.04	7.77	
Diminished Impulse Control	Users	393	23.17	9.51	29.407
	Nonusers	217	18.98	8.39	

News Reading

Most students (N=457 out of 610) responded that they use the Internet for news reading while less students (N=153 out of 610) do not use it. According to the MANOVA results in Table 7, there is a significant difference at p<.05 level for the dimension of diminished impulse control (F[1,608] =6.341; p=.012). However, no significant differences are found for the dimensions of social comfort, loneliness/depression, and distraction.

Table 7: The MANOVA results of the Dimensions of PIU for News Reading

Dimensions of PIU	News Reading	N	Mean	SD	F
Social Comfort	Users	457	27.41	10.98	2.191
	Nonusers	153	25.92	10.12	
Loneliness/depression	Users	457	12.31	5.90	3.628
	Nonusers	153	11.28	5.35	
Distraction	Users	457	18.50	8.11	0.008
	Nonusers	153	18.43	7.79	
Diminished Impulse Control	Users	457	22.23	9.56	6.341
	Nonusers	153	20.04	8.47	

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Online Shopping

121 students out of 610 responded that they have use the Internet for shopping while majority of the students (N=489) do not use it. According to the MANOVA results in Table 8 show, there are significant differences at p<.05 level on the dimensions of loneliness/depression (F[1,608] =9,017; p=.003) and diminished impulse control (F[1,608] = 5.869; p=.016). However, no significant differences are found for the dimensions of social comfort, and distraction.

Table 8: The MANOVA results of the PIU Dimensions for Online Shopping

Dimensions of PIU	Online Shopping	N	Mean	SD	F
Social Comfort	Users	121	27.83	10.94	.824
	Nonusers	489	26.84	10.74	
Loneliness/depression	Users	121	13.46	6.21	9.017
	Nonusers	489	11.70	5.63	
Distraction	Users	121	19.00	8.37	.615
	Nonusers	489	18.35	7.94	
Diminished Impulse Control	Users	121	23.52	9.62	5.869
	Nonusers	489	21.23	9.22	

Results regarding Demographics

The MANOVAs were performed with categorical groups of demographics (i.e., their Internet uses by time of day, gender) as independent variables and the four dimensions of PIU as the dependent variables to answer the second and third research questions.

Internet Use by Time of Day

The MANOVA results for the Internet use by time of day in Table 9 indicate significant difference at p<.05 level regarding the dimensions of loneliness/depression (F[4,603] =3.783; p=.005) and diminished impulse control (F[4,603]=4.138; p=.003). In Moreover, a post-hoc analysis is used to see which mean scores significantly differ from other one(s). According to the post-hoc results, the mean score of the students who prefer to use the Internet between 16.00 – 19.59 pm is significantly lower than that of the students who prefer to use it between 00.00-03.59 am on the dimension of loneliness/depression. In addition, post-hoc results show that the mean scores of the students who prefer to use the

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Internet between 12.00 – 15.59 pm and 16.00-19.59 pm are significantly lower than those of the students who prefer to use it between 00.00-03.59 am on the diminished impulse control. However, no significant differences are found for the dimensions of social comfort and distraction.

Table 9: The MANOVA results of the PIU Dimensions for Internet use by time of day

		Social Comfort		Loneliness/ depression		Distraction		Diminished Impulse Control	
Internet use times*	N	Mean	SD	Mean	SD	Mean	SD	Mean	SD
(1) 08.00-11.59 am	9	23.77	8.28	13.11	4.45	16.77	6.81	19.44	8.33
(2) 12.00-15.59 pm	94	26.59	8.91	12.15	5.19	17.97	6.50	20.11	8.10
(3) 16.00-19.59 pm	101	25.26	8.43	10.41	4.22	18.04	8.12	19.62	8.21
(4) 20.00-23.59 pm	332	27.25	11.82	12.13	6.21	18.45	8.39	22.21	9.60
(5) 00.00-03.59 am	72	29.72	10.89	13.77	6.10	20.25	8.17	24.62	10.47
F(ANOVA)		2.086		3.783		1.137		4.138	
Tukey				(3)<(5)*				(2)<(5)* (3)<(5)*	

*p<.05

* The students who use the Internet between 04.00 and 07.59 were not included in the analysis since the number of the students (N=2) were insufficient.

Moreover, according to the crosstab results, percentages (%) of the students who use the Internet for chat (61.1%, N=44 out of 72), entertainment (81.9%, N=59 out of 72) and social networking (80.6%, N=58 out of 72) are notably higher between 00.00-03.59 am as compared to those of the students who use the Internet between 12.00 – 15.59 pm for chat (46.8%, N=44 out of 94), entertainment (69.1%, N=65 out of 94) and social networking (56.4%, N=53 out of 94). Similarly, percentages of the students who use the Internet for chat (41.6, N=42 out of 101), entertainment (64.4, N=65 out of 101) and social networking (59.4%, N=60 out of 101) between 16.00-19.59 pm are notably lower as compared to those of the students who use the Internet between 00.00-03.59 am. Also, chi-square tests suggest that the students who use the Internet at late night hours (00.00-03.59 am) are more likely to use it for chat ($\chi^2 = 11.527$, df = 5, p = .042), entertainment (e.g. game) ($\chi^2 = 14.824$, df = 5, p = .011) and social networking ($\chi^2 = 13.813$, df = 5, p = .017) activities in comparison to the students use it at daytime hours (12.00-15.59 pm; 16.00-19.59 pm). However, according to the chi-square tests, the differences in the other Internet activities of the students (i.e.,

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educational Internet use, information searching through search engines, news reading, online shopping, e-mail) are not significant based on the time of day.

Gender

The MANOVA results in Table 10 reveal that the mean scores of the male students are significantly higher at p<.05 level on all dimensions (i.e., social comfort (F[1,608] = 23.264; p=.000), loneliness/ depression (F[1,608] = 6.790; p=.009), distraction (F[1,608] = 6.412; p=.0012), diminished impulse control (F[1,608] = 18,848; p=.000)) than those of the females.

Table 10: The MANOVA results of the PIU Dimensions for Gender

Dimensions of PIU	Gender	N	Mean	SD	F
Social Comfort	Female	358	25.30	9.85	23.264
	Male	252	29.50	11.56	
Loneliness/depression	Female	358	11.54	5.56	6.790
	Male	252	12.78	6.02	
Distraction	Female	358	17.79	7.77	6.412
	Male	252	19.46	8.29	
Diminished Impulse Control	Female	358	20.32	8.58	18.848
	Male	252	23.61	10.3	

Moreover, a MANOVA was conducted with Internet activities (i.e., educational Internet use, e-mail, chat, entertainment, information searching through search engines, news reading, social networking, and online shopping) as dependent variable and gender (male versus female) as the independent variable to investigate differences in Internet activities in terms of gender. The results indicate significant gender differences for four of the eight Internet activities. The male students report higher frequencies of chat [F (1, 608)=4.379, p=.037], news reading [F (1, 608)=16.569, p=.000], and shopping [F (1, 608)=14.070, p=.000]. However, the females report a higher frequency for educational Internet use [F (1, 608)=17.890, p=.000]. No significant gender differences are found for e-mail [F (1, 608)=1.467, p=.226], entertainment [F (1, 608)=3.298, p=.070], social networking [F (1, 608)=0.004, p=.952], and information searching through search engines [F (1, 608)=3.797, p=.052], although the difference is close to the significance level (p<.05) for information searching through search engines for which females reported a higher frequency.

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Results of Regression Analysis

Multiple regression analyses with stepwise method were applied to answer the fourth research question and to predict the factors influencing the dimension scores of the PIU of the students. Table 11 displays the results of the multiple regression analyses including the weights associated with regression equations (βs), *t* and *p* values. The regression coefficients indicate that the factors that significantly influence the PIU of the students are gender (β=3.83; t= 4.46, p<.05), chat (β=2.85; t= 3.26, p<.05), social networking (β=2.11; t= 2.37, p<.05), and entertainment (β=2.02; t= 2.04, p<.05) on the social comfort dimension. All these significant predictor variables account for 7.4% of the variance for the social comfort dimension.

Table 11: The results of the multiple regression analysis regarding predictors of problematic Internet use on the PIU dimensions

	Social Comfort			Loneliness/ depression			Distraction			Diminished Impulse Control		
	β	t	*p*	β	t	*p*	β	t	*p*	β	t	*p*
Constant	10.31	4.14	.000*	7.76	4.41	.000*	14.98	5.76	.000*	7.98	2.67	.008*
Gender[1]	3.83	4.46	.000*	.070	1.74	.082	.059	1.48	.139	2.59	3.53	.000*
Chat[2]	2.85	3.26	.001*	.93	1.97	.049*	2.40	3.70	.000*	2.19	2.96	.003*
Social Networking[2]	2.11	2.37	.018*	1.65	3.43	.001*	1.85	2.78	.006*	3.56	4.70	.000*
Entertainment[2]	2.02	2.04	.042*	1.32	2.44	.015*	2.58	3.46	.001*	2.53	2.97	.003*
Shopping[2]	-.020	-.510	.611	1.47	2.55	.011*	.006	.153	.879	.047	1.20	2.29
Internet Use by Time of Day[3]	.024	.60	.547	.034	.85	.392	.017	.434	.664	.793	2.05	.041*
News Reading[2]	.004	.10	.916	.037	.91	.360	-.032	-.805	.421	.046	1.16	.244
E-mail[2]	-.076	-1.90	.058	-.058	-1.41	.159	-.030	-.739	.460	-.057	-1.43	.151
Educational Internet Use[2]	.008	.205	.838	-.043	-1.08	.278	-2.04	-2.45	.014*	-.054	-1.38	.166
Information Searching[2]	-.064	-1.61	.107	-2.07	-2.84	.005*	-2.08	-2.05	.040*	-3.40	-2.96	.003*
Adjusted R^2		.074*			.059*			.075*			.118*	

*p<.05
[1]Female=1, Male =2
[2]No =1, Yes=2
[3]08.00-11.59 am=1, 12.00-15.59 pm=2, 16.00-19.59 pm=3, 20.00-23.59 pm=4, 00.00-03.59 am=5, 04.00-07-59 am=6

In regard to the dimension of loneliness/depression, variables that significantly influence the PIU of the students are information searching through search engines (β=-2.07; t= -2.84, p<.05), social networking (β=1.65; t= 3.43, p<.05), shopping (β=1.47; t= 2.55, p<.05), entertainment (β=1.32; t= 2.44, p<.05), and chat (β=.93; t= 1.97, p<.05). However,

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as different from the other factors, information searching through search engines has been found to be negatively associated with the level of the PIU of the students on the dimension of loneliness/depression. All these significant predictor variables account for about 6% of the variance for this dimension.

According to the regression coefficients, the factors such as entertainment (β=2.58; t= 3.46, p<.05) chat (β=2.40; t= 3.70, p<.05) and social networking (β=1.85; t= 2.78, p<.05) have been found to be positively associated with level of PIU of the students on the distraction dimension. Conversely, information searching through search engines (β=-2.08; t= -2.05, p<.05) and educational Internet use (β=-2.04; t= -2.45, p<.05) have been found to be negatively associated with the level of the PIU of the students on the distraction dimension. All these significant predictor variables account for about 7.5% of the variance for the distraction dimension.

Furthermore, the regression coefficients for the variables such as gender (β=2.59; t=3.53, p<.05), entertainment (β=2.53; t=2.97, p<.05), chat (β=2.19; t=2.96, p<.05) and Internet use by time of day (β=.793; t=2.05, p<.05) have been found to be positively associated with the level PIU of the students on diminished impulse control. On the other hand, the coefficients showed that information searching through search engines (β=-3.40; t=-2.96, p<.05) has been found to be negatively associated with the level of the PIU of the students on the dimension of diminished impulse control. All these significant predictor variables accounted for about 12% of the variance for this dimension.

Moreover, the results indicate that e-mail and news reading do not significantly influence the PIU of the students on any of the dimensions. However, some variables such as chat, entertainment (e.g., game) and social networking are significant predictors for all dimensions of PIU.

DISCUSSION and CONCLUSION

The purpose of the study was to investigate whether there are any differences in the Turkish undergraduate students' levels of PIU on different dimensions according to the Internet activities, gender and Internet use by time of day. Additionally, the study investigated some predictors of PIU on different dimensions among the Turkish undergraduate students.

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The MANOVA results reveal that the differences in the mean scores of the users and nonusers are significant on all dimension of PIU in favor of the nonusers of the Internet for chat, entertainment and social networking purposes. In addition, the regression coefficients show that chat, entertainment and social networking are significant predictors for all dimensions of PIU. Therefore, it can be stated that chat, entertainment (e.g., game) and social networking are the most problematic activities associated with problematic Internet use on all dimensions. Similar to the findings of this study about chat, entertainment, the related literature (e.g., Frangos, et al., 2010; Li et al., 2009; Morahan-Martin & Schumacher 2000; Charlton & Danforth 2007; Caplan, Williams & Yee, 2009) reveal that undergraduate problematic Internet users were more likely to use real-time interactive activities such as chat and online games. Additionally, the findings of this study regarding the social networking are consistent with the findings of prior studies (e.g., Morahan-Martin, & Schumacher, 2000; Caplan, 2005) which indicate that social use of the Internet may result in problematic Internet use (e.g., playing socially interactive games, compulsive Internet use). Also, a recent study (Kirschner, & Karpinski, 2010) reveals that students who report academic problems are more likely to use the Internet for social networking (e.g., Facebook) purposes.

In addition, the Internet activities including chat, entertainment (e.g., game) and social networking between 00.00-03.59 am can be considered as the factors associated with the higher PIU levels of the students on the dimensions of loneliness/depression and diminished impulse control, based on the findings of this study. Furthermore, the regression coefficients demonstrate that Internet use by time of day is a significant predictor for the dimension of diminished impulse control of PIU. The findings of this study regarding the Internet use by time of day are consistent with the results of a study conducted in Turkey at another campus which demonstrate that connecting to the Internet mostly at night rather than daytime and evening is a significant predictor of PIU among the Turkish university students (Ceyhan, 2008). In regard to the negative consequences of late night Internet use for social networking purposes, another study reveal that (Kubey et al., 2001) social uses of the Internet (e.g., instant messaging, chat) hold students captive, especially late at night, and cause them to get less sleep, and miss classes.

Moreover, each dimension points to different features of PIU regarding the Internet activities that include chat, entertainment (e.g., game), and social networking. The social comfort dimension is related to the adaptive function of loneliness which motivates the users

to reach out to others and increase their social networks (Davis et al. 2002). Thus, it can be stated that the students who use the Internet for chat, entertainment, and social networking activities are more likely to feel lonely and they get involved in such Internet activities for the purpose of social comfort which includes feelings of safety and security in being a part of that social network. According to Kim, LaRose and Peng (2009), such negative outcomes were expected to isolate individuals from healthy social activities and lead them into more loneliness. Furthermore, the students who use the Internet for the chat, entertainment, and social networking activities may be more likely to show exacerbating symptoms of PIU related to the loneliness/depression dimension that involves feelings of worthlessness, loneliness and depressive cognitions. Particularly, the depressive cognitions may play an important role in exacerbating symptoms of PIU (Davis et al. 2002). In addition, the students who use the Internet for chat, entertainment, and social networking activities can be more likely to have symptoms of PIU related to the dimension of diminished impulse control that involves risk taking activities such as online gambling (Davis et al. 2002). Additionally, the students who use the Internet for chat, entertainment (e.g., game) and social networking activities can be more likely to have symptoms of PIU related to the dimension of distraction which involves using the Internet as a tool of avoidance of a stressful event, task or stream of thought. According to Davis et al (2002), distraction is highly related to procrastination and history of reprimand at school or work for problematic Internet use.

Additionally, the findings of this study regarding the gender issue are congruent with the prior literature (e.g., Ceyhan, 2008; Shaw & Black, 2008; Chou, Condron, & Belland, 2005; Morahan-Martin, & Schumacher, 2000) which reveal that males are more likely to be involved in PIU than females. Also, the male students in this study report a significantly higher frequency for chat for which users were more likely to have higher PIU levels on all dimensions. However, the females report a significantly higher frequency for educational Internet use for which the users are less likely to have higher PIU levels on all dimensions. Therefore, the frequencies for some Internet activities such as chat and educational Internet use can be considered as factors that influence the PIU levels of the male and female students.

Consistent with the related literature (e.g., Li et al., 2009; Frangos et al., 2010), the findings in this study suggest that problematic users in this study are more likely to use Internet to chat, play games and socially interact with others. However, the findings suggest

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that healthy Internet users are more likely to use it for educational purposes such as information searching, finding and reading electronic papers and e-mail congruent with the findings of Ceyhan's (2008) study.

Finally, the findings of this study and related literature point out that PIU levels of students who use the Internet mostly for chat, entertainment and social networking are notably higher than those of the students who use Internet for educational purposes, information searching, e-mail and news reading. According to the related literature (Frangos et al., 2010; Kim et al., 2009; Caplan, 2005, Morahan-Martin, & Schumacher, 2000, Davis, 2001, Davis et al., 2002) PIU results in negative psychological, social, academic or professional consequences. For instance, Morahan-Martin and Schumacher's (2000) study indicates that problematic Internet users are more likely than non-problematic users to seek emotional support, meet new people and play socially interactive games. In addition, Caplan's (2005) study reveals that preference for online social interaction is a significant positive predictor of compulsive Internet use, and participants who prefer online social interaction consider computer mediated communication a functional alternative to their face to face interactions. In the current study, the students who use the Internet with higher frequencies for chat, entertainment and social networking are more likely to have problems related to social comfort, loneliness/depression, distraction and diminished impulse control. Based on the findings of this study and related literature (Ceyhan, 2008, Morahan-Martin, & Schumacher, 2000; Li et al., 2009; Moody, 2001; Whang, Lee & Chang 2003; Kim et al., 2009), it is possible that the problematic Internet use appears to them as a convenient alternative and source of support (e.g., social, emotional and psychological). In order to avoid negative consequences of PIU, the students can instead be provided with alternative social-emotional supports and services (e.g., counseling, sport and recreational activities) for their problems related to social comfort, loneliness/depression, distraction and diminished impulse control.

Moreover, the following implications and suggestions for educational environments can be provided based on the results of this study:

- Information searching through search engines and educational Internet use (e.g., finding and reading electronic educational papers) can be encouraged among the students since they are not positively associated with PIU.

- E-mail and online news reading can be considered as useful and harmless activities since they do not significantly influence the PIU of the students.
- The uses of Internet for chat, entertainment (e.g., game) and social networking purposes can be considered as risky activities for students in terms of PIU.
- The students should be informed about the association between Internet use at late night hours and PIU to protect them from negative consequences PIU such as less sleep and missing classes.

In regard to the gender issue, this current study cannot highlight other factors that influence the higher PIU levels of the male students and lower PIU levels of the female students except some Internet activities (e.g., chat activities of males with a higher frequency, and educational Internet uses of females with a higher frequency). Thus, future researchers may focus on other possible factors that influence the PIU levels of the male and female students.

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