

A Gender Comparative Study on South Korean Youth Internet Addiction

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ABSTRACT

As a part of advanced technology society, South Korean youth have been accessing the Internet at a very high pace. The Internet overuse could yield addiction where may be a serious psychological disorder of this century. The literature remarks that gender could make a significant difference on internet addiction. Therefore, this study aims to examine the effect of gender variable on internet addiction for a sample of South Korean university students ($n = 815$; 312 females and 503 males). The instrument had two sections; the demographics and twenty Internet Addiction survey items based on a five level scale; "Rarely, Occasionally, Frequently, Often and Always". The results showed that general tendency among the participants appeared between "Occasionally" and "Frequently" for internet addiction. In order to test five derived study hypotheses, the researchers conducted comparative statistical tests. The t-tests revealed that gender made statistically significant differences on nineteen items where males were higher than females showing that males significantly spend more time on the Internet than females. Additionally, t-tests results showed that seventeen of the survey items showed statistically significant differences with respect to types of technology dominant environment. The researchers created two dummy variables to combine gender and technology dominant environment variables and gender and school year variables, to have a better understanding the gender effect with one-way ANOVA. The gender difference still exists following its merge to technology dominant environment showing that the gender surpasses IT related environment. When school year combines to gender, males show higher scores for certain items, especially for freshman year.

Keywords: Internet Addiction, Gender, South Korea, Technology Dominant Environment

I . Introduction

Digital innovation through the development of information technology (IT) brought remarkable

changes to our society. Internet usage, mobile devices, information systems, and social media have changed a significant portion of daily life for everyone in current society regardless of their age or gender.

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In particular, the introduction of social media made rapid socialization possible as it can connect people despite time differences and physical distances. Educational institutions have also experienced a significant increase in learning and teaching efficacy as students and teachers can access online learning materials outside the classroom. In work places, IT usage and application enabled more efficient and productive communication between employers and employees, which led to increased work output.

It is undeniable that IT implementation brought numerous positive changes to our society but there are also side effects, which came along. One of the most threatening side effects, and the focus of our study, is internet addiction. Although internet addiction has not been officially classified as a mental disorder, it is becoming a major global health problem. Previous studies have proposed diagnostic criteria for internet addiction based on formal psychiatric disorders such as substance dependence (Anderson, 2001) and pathological gambling (Young, 1998). In addition, the diagnosis for internet gaming disorder, in relation to internet addiction, has now been included in the Conditions for Further Study section of the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) and the International Classification of Disease by World Health Organization (WHO) (American Psychiatric Association, 2013; World Health Organization, 2018).

In particular, Koo and Kwon (2014) highlighted the urgent need of comprehensive studies on internet addiction in South Korea due to high prevalence of internet addiction and increasing health risks. In order to gain a deeper understanding of internet addiction and reduce potential risks, the first step is to identify variables or context related to internet addiction. Together with various psychological disorders, one of the important variables related to inter-

net addiction is gender difference. Previous studies conducted both inside and outside of South Korea observed gender difference in internet addiction (Lee et al., 2006; Menon et al., 2018). In addition, there are other social or cultural factors such as family background and school life adjustment that can possibly influence internet addiction among Korean students (Choi et al., 2019). As such, our study was conducted to further investigate the significance of gender difference in internet addiction along with other associated factors. In order to expand current understanding of gender difference and internet addiction, not only the relationship between each variable and internet addiction was analyzed but also how each variable is cooperating with the gender variable was investigated. The results of this study can be utilized to reduce the risks of internet addiction and gain a better understanding of gender gaps in IT related areas.

II. Literature Review

Previous studies have reported negative effects of internet addiction on mental health. Examples include insomnia and depression (Ceung and Wong, 2010), Attention Deficit Hyperactive Disorder (ADHD) (Ko et al., 2009), drug abuse (Gong et al., 2009), and even suicidal thoughts (Fu et al., 2010). In particular, Bonnaire and Baptista (2019) reported that internet gaming disorder is associated with alexithymia, depression and anxiety. These studies were conducted on adolescents signifying that young people, particularly, are at higher risk for internet addiction due to their educational, social, and entertainment needs.

In a recent study conducted by Hsieh et al. (2019), the relationship between self-identity confusion and

internet addiction was reported. People with self-identity confusion often experience difficulties accepting themselves. There are three common types of self-identity confusion known as disturbed identity, unconsolidated identity, and lack of identity. This study involved five hundred college students from seventy different colleges across Taiwan. The results of the study showed that self-identity confusion was directly related to internet addiction and also indirectly related to internet addiction by the mediation of psychological inflexibility and experiential avoidance. Thus, it should be noted that internet addiction involves multiple psychological complications and early detection or treatment is necessary to improve mental health especially at the early stages of development.

2.1. Internet Addiction and Gender Difference

In order to understand psychological mechanisms of internet addiction, it is essential to investigate possible factors that can influence internet addiction. One of the key factors associated with internet addiction has been reported as gender difference. In a study conducted by Menon et al. (2018), gender difference in internet addiction was investigated along with other factors such as age or academic performance. This study used a survey methodology design with Internet Addictions Scale developed by Young (1998). Participants were three hundred college students (144 females and 156 males) in India. Although the results of this study showed no evidence of severe internet addiction for the participating students, there was a significant gender difference with males being more addicted than females. A high degree of correlation between age and internet addiction was also observed with older students being more addicted than younger students are. However, there was no observable rela-

tionship between internet usage and academic performance. The results of this study support our hypothesis that differences in gender and school year can influence the level of internet addiction.

Another study on gender difference and internet addiction was conducted by Li et al. (2019). Research data were collected from 1545 Chinese adolescents over six months to investigate the longitudinal associations between anxiety, depression, and internet addiction considering gender difference and obesity. According to the study results, depression and anxiety were positively associated with internet addiction while obesity was not associated. In terms of gender difference, males exhibited more internet addiction at the initial stage but they also showed a faster, declining rate of change over the six months. As our study also focuses on gender difference, the results of this study can be used as a reference to support our hypothesis and explain possible gender gaps for internet addiction.

There are also studies that reported no gender difference in relation to internet addiction. Mohammadkhani et al. (2017) conducted internet addiction test on four hundred high school students of Iran with their ages ranged from fifteen to eighteen years. The results of this study showed no significant difference between the prevalence of internet addiction in male and female students. However, there was a significant positive relationship between internet addiction and various symptoms of mental disorder such as obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation and psychoticism. Similar results were obtained by Mohammadi et al. (2012) as well as Tamanaeifar et al. (2014) who also discovered no gender difference in internet addiction.

Further clarifications on the relationship between gender difference and internet addiction are required

as the context of internet usage can also influence the study results. For example, a study was conducted by Johnson (2011) involving 51 boys and 44 girls at a primary school in Canada. Students were given a questionnaire on internet usage at home and school. The results of the study indicated that there was a gender difference in home-based internet use but no difference in school-based use. As such, studies on gender difference can be carried out under various circumstances to find out how the context of internet usage can influence internet addiction.

2.2. Internet Addiction in South Korean Context

In order to further elucidate internet addiction and the effect of gender difference, we conducted a study in South Korea where information and communication technologies have been well integrated into society. Based on statistical reports (Kemp, 2019), there are 60.43 million mobile subscribers in South Korean society meaning 118 percent of mobile technology integration to the society. The total number of mobile subscriptions has increased by 2.1 percent (nearly one million people) from 2018 to 2019. In addition, ninety-five percent of the entire society (48.74 million citizens) consists of active internet users. Similar to mobile subscriptions, internet users has increased by 2.9 percent. Moreover, eighty-five percent of the total population (43.66 million South Korean) is dynamic social media users via mobile devices. The increase in active social media users has been calculated as 1.4 percent in 2018.

Detailed scrutiny indicates that ninety-two percent of the public has at least one smart phone, seventy-one percent has a computer (desktop or laptop) and nineteen percent has a tablet device. Such well-accepted mobile technologies have increased the demand on stable and ubiquitous internet connections around

the country. Thus, South Korea has become the first country in the World with 5G connection, providing faster mobile internet connection to the public. Therefore, at the beginning of 2019, ninety-three percent of the public accessed the internet every day.

In terms of internet usage traits among Korean adolescents, a previous study conducted by Lim and Meier (2011) reported that both males and females used the internet for four general reasons: social networking, personal knowledge, formal learning, and entertainment. However, different preferences in their internet usage were observed as males spent more time on entertainment, such as multi-user online games, and females were more engaged with social networking websites.

In terms of internet addiction rate, Choi et al. (2019) reported that male students were more addicted to internet usage than female students were. The study was conducted on 209 elementary school students in South Korea. Similar results were obtained by Lee et al. (2006). This study involved 1410 high school students in Korea and the level of internet addiction was assessed using Internet Addictions Scale by Young (1998). The study reported significantly higher mean scores as well as higher frequency of internet addiction from male students.

In order to further investigate internet addiction rate at higher education institutes, our study involved 815 university students in South Korea. Although Menon et al. (2018) already conducted Young's Internet Addiction Test on 300 college students in India; there are possible cultural differences that can affect the study results. In fact, the influence of multi-cultural family background on internet addiction was previously reported (Choi et al., 2019).

As South Korea possesses a unique and advanced internet access environment, investigations on inter-

net addiction and gender difference will produce valuable outcomes for current and future studies. Moreover, the study results can be utilized to create internet usage policies at educational institutions and workplaces with consideration of gender gaps or increase self-awareness of internet addiction to prevent mental disorders among the younger generation of South Korean Society.

III. Hypotheses

This study aims to scrutinize the effect(s) of gender variable on the Internet addiction for a selected sample of university students from South Korea. When Internet Addiction literature has checked for the effect(s) of gender variable, the results have unfolded contradictions. While some researchers (such as Choi et al., 2019; Lee et al., 2006; Li et al., 2019; Menon et al., 2018) highlighted gender differences (in favor of male participants), some other researchers (such as Mohammadi et al., 2012; Mohammadkhani et al., 2017; Tamanaeifar et al., 2014) posited that gender had no effect on Internet addiction. Therefore, it is clear that the literature needs more studies to have a better comprehension. Hence, the researchers have established and tested the following hypothesis:

H1: There is a statistically significant difference on each item of Internet Addiction scale with respect to gender.

In addition to gender variable, some scholars (Johnson, 2011; Lim and Meier, 2011) postulated that Internet addiction has been influenced by the context; especially whether or not the technology is dominant. Thus, the researchers have developed and tested the following hypothesis:

H2: There is a statistically significant difference on each item of Internet Addiction scale with respect to type of technology dominant environment.

Besides gender and technology dominance level of context, the researchers (Choi et al., 2019; Lee et al., 2016) also noted that school year could affect the Internet Addiction level. In that sense, the authors wanted to test this variable and developed the hypothesis as below:

H3: There is a statistically significant difference on each item of Internet Addiction scale with respect to school year.

Since the participants of this study (sample South Korean university students) could have several variables at the same time, the overlapping effects of the variables above should be tested as well. In other words, gender and technology dominance environment could affect the Internet addiction of students together. Similarly, gender and school year could influence the students' Internet addiction jointly. To serve testing these assumptions, the authors have developed and analyzed the following hypotheses:

H4: There is a statistically significant difference on each item of Internet Addiction scale with respect to combined 'gender and type of technology dominant environment'.

H5: There is a statistically significant difference on each item of Internet Addiction scale with respect to combined 'gender and school-year'.

IV. Method

4.1. Sample

South Korea is a high-tech country where the Internet has been deeply infused into the society. Hence, South Korea becomes a vital focus of attention to study Internet addiction. Similar to other countries, Korean youth is the most dominant group of Internet users where nearly all of them use the Internet daily. Hence, the researchers focused on a sample of Korean youth by convenience sampling method to attain a larger sample size, which would increase the likelihood of population representation (Fraenkel and Wallen, 2000).

On the other hand, Fraenkel, Wallen and Hyun (2012) remarked that convenience sampling might bring the disadvantage of sampling bias. They suggest that in such case of convenience sampling was implemented, the manuscript must “...include information on demographic and other characteristics of the sample studied” (p. 100). Therefore, the researchers explained the sample as detailed as possible throughout the paper. Moreover, the researchers attempted to decrease the role of sampling bias by announcing the study to the entire university (not only to the students from their departments) and increase the sample size as much as they can to affect the likelihood of representation ($n = 815$).

To serve the study purposes, the researchers focused on a group of university students from a private university centrally located in the country. Out of 375 universities, this university was ranked at the 126th position indicating that the sample was based from a fairly average university (Ranking Web of Universities, 2020). This study has been delimited to Korean students of the university, regardless of medium of instruction, even though the university offers both Korean and English language instruction.

Subsequent to the preparation of survey and its translation into Korean, the survey was uploaded to a survey webpage and announced from university portal. At the end of two weeks, the survey was terminated and the dataset was downloaded for analysis.

After cleaning the missing data, the final survey data included 815 Korean students. <Table 1> demonstrates gender (female / male) versus school levels (freshmen / sophomore / junior / senior). As the table shows, 38.3 percent of the participants were female ($n = 312$) and 61.7 percent were male ($n = 503$). The majority of the participants were junior (31.5%) and senior (31%) students.

The researchers consider students' department as an important demographic for stimulating (or discouraging) Internet addiction. Therefore, the study participants were asked whether they study in a technology dominant environment or not. The results

<Table 1> Gender Versus School Level of Study Participants

Levels	Gender		Total
	Female	Male	
Freshmen	70	56	126
Sophomore	69	110	179
Junior	116	141	257
Senior	57	196	253
Total	312	503	815

showed that 70 percent of the students ($n = 570$) were studying in a technology dominant environment, and 30 percent were studying in a non-tech dominant environment ($n = 245$).

4.2. Study Instrument

The study instrument has two parts; the demographics (gender, technology environment (dominant/non-dominant) and school level) and the Internet Addiction survey with 20 items. As one of the important results of meta-analysis empirical studies conducted in South Korea, Koo and Kwon (2014) reported that younger age groups are more open to be addicted to Internet use. Therefore, the researcher decided to add school level as another independent variable to this study.

The researchers hypothesized that the departments which highly utilize information and communication technologies for their courses (whether or not technology is dominant in the environment), will also trigger the Internet addiction, since the students will tend to spend more time online for their instructional activities. When the researchers checked the literature on the effect of department type on the Internet addiction, they realized controversial results. For instance, Akdağ et al. (2014) reported that there was no relationship between the department type and the Internet addiction ($n = 13689$ university students). Similarly, Ghamari et al. (2011) also noted they could not identify any link between the Internet addiction and field of study ($n = 426$ university students). On the other hand, the recent studies showed that university students' departments would affect their Internet addiction levels (Seki et al., 2019 ($n = 3251$ university students); Taha et al., 2019 ($n = 216$ university students)). Therefore, the researchers added the type of technology dominant environment varia-

ble in order to see its solid effect to the Internet addiction and more significantly its joint effect with the gender variable to the same Internet addiction scale.

The study utilized the most common analytical instrument for Internet addiction; the Internet Addiction Test (IAT) which was developed by Young (1998). Although the Young's instrument has been nearly twenty years old, it is still commonly implemented in different disciplines (such as psychology & psychiatry, information and communication technologies, medical sciences) and well accepted by scholars from all around the world. Recent studies such as Mamun et al. (2019), Tateno et al. (2019), Veena et al. (2019), Yang et al. (2019), Tateno et al. (2018), So et al. (2017) and Kawabe et al. (2016) have used the original version of Young's instrument of Internet Addiction (1998).

The items in Young's instrument (1998) are answered on a five level scale; "Rarely (1), Occasionally (2), Frequently (3), Often (4) and Always (5)". According to Young (1998), the total higher score of an individual shows greater Internet addiction level. Young offers three levels of Internet addiction based on the total score of individuals; low (20-49 points), moderate (50-79 points) and high (80-100 points). The low level represents an average user with a self-control mechanism of using the Internet. The moderate level characterizes a user experiencing frequent problems due to the Internet addiction. Lastly, the high level demonstrates an Internet user who has many significant Internet addiction/usage related problems on daily basis.

Once the survey was ready, it was translated into Korean and double-checked by Korean language experts. At the end of the data collection, the Cronbach alpha reliability coefficient was calculated for the 20-item survey as 0.93; showing a high reli-

ability for the study (Fraenkel and Wallen, 2000).

4.3. Data Analysis

Different quantitative analyses were conducted on the final data-set. Initially, after cleaning missing data from the data-set, reliability analyses were performed, which showed a highly satisfactory Cronbach alpha coefficient. Then, the frequencies of the data-set for basic demographics (gender, dominant versus non-dominant technology environment and school level) were calculated and presented in contingency tables. Basic statistics of each Internet addiction survey item (mean scores and standard deviations) were also calculated and tabulated. Although different studies prefer to use Young's Internet Addiction scale's categories to talk about their results, the researchers additionally decided to concentrate on each item in the scale in order to get a deeper perspective for the effects of independent variables. Furthermore, internet addiction level of each gender was analyzed and presented in a contingency table.

Lastly, the researchers conducted comparison based tests to test hypotheses. Independent sample t-tests were run to check if gender (female versus male) made significant differences among the Internet Addiction survey items (Hypothesis 1). Another set of independent sample t-tests were implemented on the data-set to see if the structure of the environment (technology dominant or not) made significant differences on survey items (Hypothesis 2). One-way ANOVA tests were run on the data to reveal if schooling level (freshman, sophomore, junior and senior) made significant differences on the Internet addiction survey items (Hypothesis 3). Moreover, the researchers created a dummy variable to combine gender and type of technology dominant environment variables to check

its effect on the Internet addiction with one-way ANOVAs (Hypothesis 4). Lastly, the researchers created another dummy variable to combine gender and school year variables to analyze their joint effect on the Internet addiction with one-way ANOVAs (Hypothesis 5).

V. Results

5.1. The Fundamental Findings

<Table 2> shows twenty items of the Internet Addiction survey with their mean scores and standard deviations. The highest mean score is 3.21 (item 1) and the lowest mean score is 2.38 (item 18). Therefore, the general tendency of the participants for the survey items appears between "Occasionally" and "Frequently". Since the standard deviations do not disperse much (from 1.19 to 1.37) or coefficient of variations (standard deviation divided by mean) are not higher than or equal to 1.00 for any item, it could be concluded that participants do not vary much around the survey items.

As Young (1998) explained, the total score of these twenty items gives the internet addiction score of an individual, which lies between 20 and 100. Thus, the researchers calculated all individuals' Internet Addiction scores separately and calculated basic statistics. The overall mean score of the Internet Addiction survey from 815 participants was calculated as 52.96 with a standard deviation of 16.98 (20 and 93 are the minimum and maximum scores respectively). These statistics also reveal that Internet addiction of the participants was average (modest) level.

Young (1998) also offers three levels of Internet addiction based on the total score of individuals;

<Table 2> Survey Questions and their Basic Statistics ($n = 815$)

1	The Survey Items	M	SD
2	How often do you find that you stay on-line longer than you intended?	3.21	1.19
3	How often do you neglect household chores to spend more time on-line?	2.71	1.23
4	How often do you prefer the excitement of the Internet to intimacy with your partner?	2.56	1.28
5	How often do you form new relationships with fellow on-line users?	2.40	1.35
6	How often do others in your life complain to you about the amount of time you spend on-line?	2.66	1.33
7	How often do your grades or school work suffers because of the amount of time you spend on-line?	2.55	1.34
8	How often do you check your email before something else that you need to do?	2.86	1.32
9	How often does your job performance or productivity suffer because of the Internet?	2.58	1.21
10	How often do you become defensive or secretive when anyone asks you what you do on-line?	2.51	1.28
11	How often do you block out disturbing thoughts about your life with soothing thoughts of the Internet?	2.74	1.26
12.	How often do you find yourself anticipating when you will go on-line again?	2.77	1.29
13	How often do you fear that life without the Internet would be boring, empty, and joyless?	2.78	1.29
14	How often do you snap, yell, or act annoyed if someone bothers you while you are on-line?	2.52	1.32
15	How often do you lose sleep due to late-night log-ins?	2.67	1.28
16	How often do you feel preoccupied with the Internet when off-line, or fantasize about being on-line?	2.62	1.32
17	How often do you find yourself saying “just a few more minutes” when on-line?	2.80	1.30
18	How often do you try to cut down the amount of time you spend on-line and fail?	2.61	1.32
19	How often do you try to hide how long you’ve been on-line?	2.38	1.32
20	How often do you choose to spend more time on-line over going out with others?	2.59	1.31
21	How often do you feel depressed, moody or nervous when you are off-line, which goes away once you are back on-line?	2.44	1.37

<Table 3> The Gender Versus Internet Addiction Levels

		Internet Addiction Levels			Total
		Low	Moderate	High	
Gender	Female	157	149	6	312
	Male	175	298	30	503
Total		332	447	36	815

low (20-49 points), moderate (50-79 points) and high (80-100 points). Fifty-five percent of the participants ($n = 447$) showed a moderate level of Internet addiction. Forty-one percent ($n = 332$) were marked with a low level of Internet addiction. The final four percent ($n = 36$) of the participants were reported as highly Internet addict. <Table 3> shows the

Internet Addiction levels distribution on the gender variable. Although it seems a gap between the number of female and male for high and moderate levels, the low level seems nearly equally distributed for both genders.

5.2. The Comparative Findings

The researchers utilized comparative tests to validate their hypotheses. The first comparison based analysis for hypothesis 1 was conducted on the gender variable for all items. The results of independent sample t-tests revealed that nineteen of the survey items showed statistically significant differences with respect to the gender variable where our hypothesis 1 validated. The only non-significant differentiating item was question sixteen; “How often do you find yourself saying “just a few more minutes” when on-line?”. The Levene’s test for equality of variances showed that seventeen items had equal variances within levels of gender (item 6 and item 20 were the exceptions). <Table 4> demonstrates all statistically significant items with their means, standard deviations, t values and significance values (p).

When the mean scores of each significant item were scrutinized, it is apparent that the scores of male participants were higher than females. This shows that male participants spend significantly more time on these items than do female participants.

The second comparison for hypothesis 2 was conducted on the environment variable (technology dominant versus non-dominant) for all items. The results of independent sample t-tests demonstrated the validation of hypothesis 2 that seventeen of the survey items showed statistically significant differences with respect to the technology dominant environment variable (excepting items 1, 6 and 14). The Levene’s test for equality of variances showed that sixteen items had equal variances within type of technology dominant environment variable levels (item 2 was the exception). <Table 5> shows all statistically significant items with their means, standard deviations, t values and significance values (p). The mean scores of significantly differentiating items demon-

strate that technology dominant environment students are more addicted to the Internet than their counterparts.

The survey items were also checked with regard to whether or not school level makes a significant difference on the Internet addiction by using one-way ANOVA to test hypothesis 3. Among all twenty items, only item six (“How often do your grades or school work suffers because of the amount of time you spend on-line?”) showed a significant difference at the $p < .05$ level for the four levels (freshmen, sophomore, junior and senior) [$F(3, 811) = 2.844, p = 0.037$] validating our hypothesis 3. We questioned which level(s) made a significant difference among others using Scheffe and Dunnett-C post-hoc tests. None of levels showed a significant test for the post-hoc tests. Hence, it could be concluded that the significant difference on item six might result from the chance factor of the statistical analyses. In the future, the analysis should be re-applied by increasing the sample size.

To test hypothesis 4, the researchers created a dummy variable to combine gender and type of technology dominant environment variables (with four levels; Female_NonDominant, Female_Dominant, Male_NonDominant and Male_Dominant) to have a better and deeper understanding the effect on gender on the survey items. The one-way ANOVA results demonstrated that nineteen survey items (except item one) were statistically significantly differentiating around that new dummy variable validating hypothesis 4. In order to understand which group or groups significantly differ from the others, the researchers applied Dunnett C post-tests. Except item sixteen, all eighteen items showed the differentiating group(s) (<Table 6>). When the results were checked, it is clear that male students from technology dominant environment mostly significantly differ from all other

groups, which shows Internet addiction. Additionally female students from non-dominant technology environments look less Internet addicted among other

groups. For survey items 3 and 14, males still scored higher than females for each respective type of technology dominant environment but the type of tech-

<Table 4> Independent Samples t-test Results according to Gender Variable

Item Number and Content	Gender	<i>n</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>
1. How often do you find that you stay on-line longer than you intended?	Female	312	3.09	1.18	-2.246	0.025
	Male	503	3.28	1.18		
2. How often do you neglect household chores to spend more time on-line?	Female	312	2.55	1.19	-3.013	0.003
	Male	503	2.81	1.24		
3. How often do you prefer the excitement of the Internet to intimacy with your partner?	Female	312	2.39	1.24	-2.988	0.003
	Male	503	2.66	1.29		
4. How often do you form new relationships with fellow on-line users?	Female	312	2.05	1.31	-5.868	0.000
	Male	503	2.61	1.33		
5. How often do others in your life complain to you about the amount of time you spend on-line?	Female	312	2.46	1.35	-3.423	0.001
	Male	503	2.79	1.31		
6. How often do your grades or school work suffers because of the amount of time you spend on-line?	Female	312	2.31	1.22	-4.098	0.000
	Male	503	2.69	1.40		
7. How often do you check your email before something else that you need to do?	Female	312	2.73	1.30	-2.186	0.029
	Male	503	2.94	1.33		
8. How often does your job performance or productivity suffer because of the Internet?	Female	312	2.46	1.20	-2.263	0.024
	Male	503	2.66	1.21		
9. How often do you become defensive or secretive when anyone asks you what you do on-line?	Female	312	2.26	1.22	-4.369	0.000
	Male	503	2.66	1.30		
10. How often do you block out disturbing thoughts about your life with soothing thoughts of the Internet?	Female	312	2.60	1.25	-2.488	0.013
	Male	503	2.82	1.26		
11. How often do you find yourself anticipating when you will go on-line again?	Female	312	2.59	1.24	-3.221	0.001
	Male	503	2.88	1.31		
12. How often do you fear that life without the Internet would be boring, empty, and joyless?	Female	312	2.60	1.22	-3.146	0.002
	Male	503	2.89	1.31		
13. How often do you snap, yell, or act annoyed if someone bothers you while you are on-line?	Female	312	2.33	1.27	-3.126	0.002
	Male	503	2.63	1.33		
14. How often do you lose sleep due to late-night log-ins?	Female	312	2.45	1.23	-4.036	0.000
	Male	503	2.82	1.29		
15. How often do you feel preoccupied with the Internet when off-line, or fantasize about being on-line?	Female	312	2.43	1.27	-3.342	0.001
	Male	503	2.75	1.34		
16. How often do you find yourself saying "just a few more minutes" when on-line?	Female	312	2.71	1.28	-1.373	0.170
	Male	503	2.85	1.32		
17. How often do you try to cut down the amount of time you spend on-line and fail?	Female	312	2.17	1.30	-2.324	0.020
	Male	503	2.50	1.31		
18. How often do you try to hide how long you've been on-line?	Female	312	2.33	1.24	-3.503	0.000
	Male	503	2.75	1.33		
19. How often do you choose to spend more time on-line over going out with others?	Female	312	2.21	1.31	-4.497	0.000
	Male	503	2.59	1.39		
20. How often do you feel depressed, moody or nervous when you are off-line, which goes away once you are back on-line?	Female	312	3.09	1.18	-4.005	0.000
	Male	503	3.28	1.18		

nology dominant environment effect for male students appears to be opposite to other survey items. Since the gender difference still exists even after it was

merged with the type of technology dominant environment variable, it shows that the gender characteristic surpasses the IT related exposures or environment.

<Table 5> Independent Samples t-test Results according to Technology Environment Variable

Item Number and Content	Field	n	M	SD	t	p
1. How often do you find that you stay on-line longer than you intended?	Tech Dominant	570	3.24	1.17	1.141	0.254
	Non- Dominant	245	3.14	1.21		
2. How often do you neglect household chores to spend more time on-line?	Tech Dominant	570	2.79	1.19	2.880	0.004
	Non- Dominant	245	2.52	1.28		
3. How often do you prefer the excitement of the Internet to intimacy with your partner?	Tech Dominant	570	2.63	1.29	2.363	0.018
	Non- Dominant	245	2.40	1.25		
4. How often do you form new relationships with fellow on-line users?	Tech Dominant	570	2.50	1.33	3.368	0.001
	Non- Dominant	245	2.16	1.37		
5. How often do others in your life complain to you about the amount of time you spend on-line?	Tech Dominant	570	2.75	1.31	2.976	0.003
	Non- Dominant	245	2.45	1.36		
6. How often do your grades or school work suffers because of the amount of time you spend on-line?	Tech Dominant	570	2.60	1.34	1.581	0.114
	Non- Dominant	245	2.43	1.34		
7. How often do you check your email before something else that you need to do?	Tech Dominant	570	2.93	1.30	2.286	0.023
	Non- Dominant	245	2.70	1.35		
8. How often does your job performance or productivity suffer because of the Internet?	Tech Dominant	570	2.66	1.20	2.780	0.006
	Non- Dominant	245	2.40	1.21		
9. How often do you become defensive or secretive when anyone asks you what you do on-line?	Tech Dominant	570	2.60	1.27	2.979	0.003
	Non- Dominant	245	2.31	1.29		
10. How often do you block out disturbing thoughts about your life with soothing thoughts of the Internet?	Tech Dominant	570	2.81	1.25	2.440	0.015
	Non- Dominant	245	2.57	1.27		
11. How often do you find yourself anticipating when you will go on-line again?	Tech Dominant	570	2.86	1.29	3.199	0.001
	Non- Dominant	245	2.55	1.26		
12. How often do you fear that life without the Internet would be boring, empty, and joyless?	Tech Dominant	570	2.85	1.27	2.412	0.016
	Non- Dominant	245	2.62	1.30		
13. How often do you snap, yell, or act annoyed if someone bothers you while you are on-line?	Tech Dominant	570	2.62	1.30	3.582	0.000
	Non- Dominant	245	2.27	1.31		
14. How often do you lose sleep due to late-night log-ins?	Tech Dominant	570	2.70	1.26	1.015	0.311
	Non- Dominant	245	2.60	1.34		
15. How often do you feel preoccupied with the Internet when off-line, or fantasize about being on-line?	Tech Dominant	570	2.72	1.31	3.142	0.002
	Non- Dominant	245	2.40	1.33		
16. How often do you find yourself saying "just a few more minutes" when on-line?	Tech Dominant	570	2.87	1.31	2.433	0.015
	Non- Dominant	245	2.63	1.28		
17. How often do you try to cut down the amount of time you spend on-line and fail?	Tech Dominant	570	2.69	1.31	2.400	0.017
	Non- Dominant	245	2.44	1.33		
18. How often do you try to hide how long you've been on-line?	Tech Dominant	570	2.48	1.31	3.347	0.001
	Non- Dominant	245	2.14	1.30		
19. How often do you choose to spend more time on-line over going out with others?	Tech Dominant	570	2.67	1.30	2.642	0.008
	Non- Dominant	245	2.41	1.32		
20. How often do you feel depressed, moody or nervous when you are off-line, which goes away once you are back on-line?	Tech Dominant	570	2.57	1.36	4.093	0.0000
	Non- Dominant	245	2.15	1.37		

<Table 6> One-way ANOVA Results according to Gender and Typeofenvironment Variable

Items	Levels	n	M	SD	F (df = 811)	p	Dunnett C post-hoc test results
1. How often do you find that you stay on-line longer than you intended?	Female_Dominant	187	3,15	1,16	2,041	0,107	----
	Female_NonDominant	125	3,01	1,21			
	Male_Dominant	383	3,29	1,18			
	Male_NonDominant	120	3,28	1,21			
2. How often do you neglect household chores to spend more time on-line?	Female_Dominant	187	2,69	1,17	5,548	0,001	Male_Dominant > Female_NonDominant
	Female_NonDominant	125	2,34	1,18			
	Male_Dominant	383	2,85	1,20			
	Male_NonDominant	120	2,71	1,36			
3. How often do you prefer the excitement of the Internet to intimacy with your partner?	Female_Dominant	187	2,57	1,29	6,120	0,000	Female_Dominant > Female_NonDominant Male_Dominant > Female_NonDominant Male_NonDominant > Female_NonDominant
	Female_NonDominant	125	2,12	1,12			
	Male_Dominant	383	2,66	1,28			
	Male_NonDominant	120	2,68	1,32			
4. How often do you form new relationships with fellow on-line users?	Female_Dominant	187	2,13	1,33	13,628	0,000	Male_Dominant > Female_Dominant Male_Dominant > Female_NonDominant
	Female_NonDominant	125	1,94	1,28			
	Male_Dominant	383	2,68	1,29			
	Male_NonDominant	120	2,38	1,42			
5. How often do others in your life complain to you about the amount of time you spend on-line?	Female_Dominant	187	2,58	1,34	5,962	0,001	Male_Dominant > Female_NonDominant
	Female_NonDominant	125	2,28	1,36			
	Male_Dominant	383	2,84	1,29			
	Male_NonDominant	120	2,63	1,35			
6. How often do your grades or school work suffers because of the amount of time you spend on-line?	Female_Dominant	187	2,38	1,23	5,688	0,001	Male_Dominant > Female_NonDominant
	Female_NonDominant	125	2,21	1,20			
	Male_Dominant	383	2,70	1,38			
	Male_NonDominant	120	2,67	1,45			
7. How often do you check your email before something else that you need to do?	Female_Dominant	187	2,83	1,29	2,947	0,032	Male_Dominant > Female_NonDominant
	Female_NonDominant	125	2,58	1,30			
	Male_Dominant	383	2,97	1,30			
	Male_NonDominant	120	2,83	1,40			
8. How often does your job performance or productivity suffer because of the Internet?	Female_Dominant	187	2,63	1,24	4,756	0,003	Female_Dominant > Female_NonDominant Male_Dominant > Female_NonDominant
	Female_NonDominant	125	2,22	1,10			
	Male_Dominant	383	2,68	1,19			
	Male_NonDominant	120	2,60	1,28			
9. How often do you become defensive or secretive when anyone asks you what you do on-line?	Female_Dominant	187	2,38	1,20	8,262	0,000	Male_Dominant > Female_Dominant Male_Dominant > Female_NonDominant
	Female_NonDominant	125	2,09	1,22			
	Male_Dominant	383	2,70	1,29			
	Male_NonDominant	120	2,53	1,32			
10. How often do you block out disturbing thoughts about your life with soothing thoughts of the Internet?	Female_Dominant	187	2,68	1,23	3,479	0,016	Male_Dominant > Female_NonDominant
	Female_NonDominant	125	2,46	1,28			
	Male_Dominant	383	2,86	1,25			
	Male_NonDominant	120	2,68	1,26			

<Table 6> One-way ANOVA Results according to Gender and Typeofenvironment Variable (Cont.)

Items	Levels	n	M	SD	F (df = 811)	p	Dunnett C post-hoc test results
11. How often do you find yourself anticipating when you will go on-line again?	Female_Dominant	187	2,72	1,27	5,994	0,000	Male_ Dominant > Female_NonDominant
	Female_NonDominant	125	2,39	1,18			
	Male_Dominant	383	2,94	1,30			
	Male_NonDominant	120	2,72	1,33			
12. How often do you fear that life without the Internet would be boring, empty, and joyless?	Female_Dominant	187	2,65	1,18	4,691	0,003	Male_ Dominant > Female_NonDominant
	Female_NonDominant	125	2,54	1,29			
	Male_Dominant	383	2,95	1,31			
	Male_NonDominant	120	2,70	1,32			
13. How often do you snap, yell, or act annoyed if someone bothers you while you are on-line?	Female_Dominant	187	2,49	1,23	6,622	0,000	Male_ Dominant > Female_NonDominant
	Female_NonDominant	125	2,10	1,29			
	Male_Dominant	383	2,69	1,34			
	Male_NonDominant	120	2,43	1,31			
14. How often do you lose sleep due to late-night log-ins?	Female_Dominant	187	2,51	1,19	5,988	0,000	Male_ Dominant > Female_NonDominant Male_NonDominant > Female_NonDominant
	Female_NonDominant	125	2,34	1,28			
	Male_Dominant	383	2,80	1,28			
	Male_NonDominant	120	2,88	1,34			
15. How often do you feel preoccupied with the Internet when off-line, or fantasize about being on-line?	Female_Dominant	187	2,57	1,27	6,252	0,000	Male_ Dominant > Female_NonDominant
	Female_NonDominant	125	2,22	1,26			
	Male_Dominant	383	2,79	1,32			
	Male_NonDominant	120	2,60	1,37			
16. How often do you find yourself saying "just a few more minutes" when on-line?	Female_Dominant	187	2,81	1,32	2,290	0,077	None
	Female_NonDominant	125	2,58	1,21			
	Male_Dominant	383	2,90	1,30			
	Male_NonDominant	120	2,68	1,36			
17. How often do you try to cut down the amount of time you spend on-line and fail?	Female_Dominant	187	2,57	1,27	3,190	0,023	Male_ Dominant > Female_NonDominant
	Female_NonDominant	125	2,34	1,34			
	Male_Dominant	383	2,74	1,32			
	Male_NonDominant	120	2,55	1,31			
18. How often do you try to hide how long you've been on-line?	Female_Dominant	187	2,26	1,33	6,881	0,000	Male_ Dominant > Female_ Dominant Male_ Dominant > Female_NonDominant
	Female_NonDominant	125	2,05	1,24			
	Male_Dominant	383	2,58	1,29			
	Male_NonDominant	120	2,24	1,35			
19. How often do you choose to spend more time on-line over going out with others?	Female_Dominant	187	2,46	1,24	8,406	0,000	Male_ Dominant > Female_NonDominant Male_NonDominant > Female_NonDominant
	Female_NonDominant	125	2,14	1,24			
	Male_Dominant	383	2,78	1,32			
	Male_NonDominant	120	2,68	1,35			
20. How often do you feel depressed, moody or nervous when you are off-line, which goes away once you are back on-line?	Female_Dominant	187	2,40	1,30	9,629	0,000	Female_ Dominant > Female_NonDominant Male_ Dominant > Female_NonDominant
	Female_NonDominant	125	1,92	1,28			
	Male_Dominant	383	2,66	1,38			
	Male_NonDominant	120	2,38	1,42			

<Table 7> One-way ANOVA Results according to Gender and Schoolyear Variable

Items	Levels	<i>n</i>	<i>M</i>	<i>SD</i>	<i>F</i> (<i>df</i> = 807)	<i>p</i>	Dunnett C post-hoc test results
1. How often do you find that you stay on-line longer than you intended?	Female_Freshman	70	2,91	1,25	1,311	0,24	---
	Female_Sophomore	69	3,17	1,12			
	Female_Junior	116	3,20	1,21			
	Female_Senior	57	3,00	1,09			
	Male_Freshman	56	3,18	1,28			
	Male_Sophomore	110	3,36	1,09			
	Male_Junior	141	3,28	1,17			
	Male_Senior	196	3,28	1,22			
2. How often do you neglect household chores to spend more time on-line?	Female_Freshman	70	2,56	1,30	2,068	0,04	None
	Female_Sophomore	69	2,42	1,14			
	Female_Junior	116	2,61	1,21			
	Female_Senior	57	2,56	1,05			
	Male_Freshman	56	3,11	1,29			
	Male_Sophomore	110	2,73	1,26			
	Male_Junior	141	2,84	1,21			
	Male_Senior	196	2,76	1,23			
3. How often do you prefer the excitement of the Internet to intimacy with your partner?	Female_Freshman	70	2,41	1,20	2,181	0,03	None
	Female_Sophomore	69	2,32	1,12			
	Female_Junior	116	2,37	1,28			
	Female_Senior	57	2,47	1,38			
	Male_Freshman	56	3,00	1,32			
	Male_Sophomore	110	2,70	1,26			
	Male_Junior	141	2,67	1,39			
	Male_Senior	196	2,54	1,22			
4. How often do you form new relationships with fellow on-line users?	Female_Freshman	70	2,16	1,33	5,480	0,00	Male_Freshman > Female_Junior Male_Freshman > Female_Sophomore Male_Senior > Female_Junior Male_Senior > Female_Sophomore Male_Sophomore > Female_Junior
	Female_Sophomore	69	2,04	1,31			
	Female_Junior	116	2,01	1,28			
	Female_Senior	57	2,02	1,40			
	Male_Freshman	56	2,84	1,37			
	Male_Sophomore	110	2,64	1,33			
	Male_Junior	141	2,47	1,38			
	Male_Senior	196	2,63	1,28			
5. How often do others in your life complain to you about the amount of time you spend on-line?	Female_Freshman	70	2,54	1,50	2,526	0,01	Male_Sophomore > Female_Junior
	Female_Sophomore	69	2,38	1,24			
	Female_Junior	116	2,41	1,32			
	Female_Senior	57	2,54	1,39			
	Male_Freshman	56	2,96	1,46			
	Male_Sophomore	110	2,97	1,30			
	Male_Junior	141	2,65	1,22			
	Male_Senior	196	2,72	1,32			

<Table 7> One-way ANOVA Results according to Gender and Schoolyear Variable (Cont.)

Items	Levels	<i>n</i>	<i>M</i>	<i>SD</i>	<i>F</i> (<i>df</i> = 807)	<i>p</i>	Dunnett C post-hoc test results
6. How often do your grades or school work suffers because of the amount of time you spend on-line?	Female_Freshman	70	2,54	1,28	3,622	0,00	Male_Freshman > Female_Sophomore Male_Freshman > Female_Junior Male_Senior > Female_Junior
	Female_Sophomore	69	2,20	1,08			
	Female_Junior	116	2,21	1,18			
	Female_Senior	57	2,37	1,37			
	Male_Freshman	56	3,02	1,52			
	Male_Sophomore	110	2,72	1,42			
	Male_Junior	141	2,51	1,27			
Male_Senior	196	2,71	1,42				
7. How often do you check your email before something else that you need to do?	Female_Freshman	70	2,74	1,26	1,320	0,24	---
	Female_Sophomore	69	2,46	1,24			
	Female_Junior	116	2,88	1,33			
	Female_Senior	57	2,74	1,36			
	Male_Freshman	56	2,93	1,33			
	Male_Sophomore	110	2,90	1,26			
	Male_Junior	141	2,94	1,31			
Male_Senior	196	2,96	1,39				
8. How often does your job performance or productivity suffer because of the Internet?	Female_Freshman	70	2,71	1,26	2,361	0,02	Male_Freshman > Female_Senior
	Female_Sophomore	69	2,41	1,14			
	Female_Junior	116	2,49	1,17			
	Female_Senior	57	2,16	1,21			
	Male_Freshman	56	2,95	1,39			
	Male_Sophomore	110	2,60	1,19			
	Male_Junior	141	2,70	1,15			
Male_Senior	196	2,58	1,20				
9. How often do you become defensive or secretive when anyone asks you what you do on-line?	Female_Freshman	70	2,36	1,19	3,523	0,00	Male_Freshman > Female_Junior
	Female_Sophomore	69	2,25	1,19			
	Female_Junior	116	2,26	1,24			
	Female_Senior	57	2,18	1,27			
	Male_Freshman	56	3,00	1,48			
	Male_Sophomore	110	2,55	1,22			
	Male_Junior	141	2,66	1,32			
Male_Senior	196	2,63	1,26				
10. How often do you block out disturbing thoughts about your life with soothing thoughts of the Internet?	Female_Freshman	70	2,69	1,41	1,125	0,34	---
	Female_Sophomore	69	2,58	1,17			
	Female_Junior	116	2,56	1,20			
	Female_Senior	57	2,58	1,28			
	Male_Freshman	56	2,91	1,30			
	Male_Sophomore	110	2,72	1,29			
	Male_Junior	141	2,81	1,27			
Male_Senior	196	2,86	1,22				

<Table 7> One-way ANOVA Results according to Gender and Schoolyear Variable (Cont.)

Items	Levels	<i>n</i>	<i>M</i>	<i>SD</i>	<i>F</i> (<i>df</i> = 807)	<i>p</i>	Dunnett C post-hoc test results
11. How often do you find yourself anticipating when you will go on-line again?	Female_Freshman	70	2,67	1,28	2,461	0,02	None
	Female_Sophomore	69	2,64	1,16			
	Female_Junior	116	2,56	1,23			
	Female_Senior	57	2,47	1,32			
	Male_Freshman	56	3,18	1,28			
	Male_Sophomore	110	2,78	1,24			
	Male_Junior	141	2,99	1,36			
12. How often do you fear that life without the Internet would be boring, empty, and joyless?	Female_Freshman	70	2,76	1,28	2,108	0,04	None
	Female_Sophomore	69	2,51	1,26			
	Female_Junior	116	2,60	1,16			
	Female_Senior	57	2,53	1,26			
	Male_Freshman	56	3,00	1,28			
	Male_Sophomore	110	2,99	1,26			
	Male_Junior	141	2,95	1,31			
13. How often do you snap, yell, or act annoyed if someone bothers you while you are on-line?	Female_Freshman	70	2,39	1,34	1,635	0,12	---
	Female_Sophomore	69	2,25	1,24			
	Female_Junior	116	2,40	1,26			
	Female_Senior	57	2,25	1,23			
	Male_Freshman	56	2,68	1,42			
	Male_Sophomore	110	2,65	1,34			
	Male_Junior	141	2,55	1,30			
14. How often do you lose sleep due to late-night log-ins?	Female_Freshman	70	2,50	1,29	2,671	0,01	None
	Female_Sophomore	69	2,35	1,01			
	Female_Junior	116	2,50	1,26			
	Female_Senior	57	2,39	1,35			
	Male_Freshman	56	2,96	1,21			
	Male_Sophomore	110	2,71	1,26			
	Male_Junior	141	2,84	1,33			
15. How often do you feel preoccupied with the Internet when off-line, or fantasize about being on-line?	Female_Freshman	70	2,43	1,40	2,110	0,04	None
	Female_Sophomore	69	2,42	1,17			
	Female_Junior	116	2,50	1,25			
	Female_Senior	57	2,30	1,30			
	Male_Freshman	56	3,00	1,26			
	Male_Sophomore	110	2,71	1,34			
	Male_Junior	141	2,77	1,36			
Male_Senior	196	2,68	1,34				

<Table 7> One-way ANOVA Results according to Gender and Schoolyear Variable (Cont.)

Items	Levels	n	M	SD	F (df = 807)	p	Dunnett C post-hoc test results
16. How often do you find yourself saying “just a few more minutes” when on-line?	Female_Freshman	70	2,60	1,28	1,329	0,23	---
	Female_Sophomore	69	2,64	1,18			
	Female_Junior	116	2,78	1,33			
	Female_Senior	57	2,84	1,31			
	Male_Freshman	56	3,04	1,36			
	Male_Sophomore	110	2,63	1,28			
	Male_Junior	141	2,98	1,33			
	Male_Senior	196	2,82	1,31			
17. How often do you try to cut down the amount of time you spend on-line and fail?	Female_Freshman	70	2,67	1,39	1,585	0,14	---
	Female_Sophomore	69	2,41	1,15			
	Female_Junior	116	2,34	1,27			
	Female_Senior	57	2,60	1,43			
	Male_Freshman	56	2,89	1,34			
	Male_Sophomore	110	2,57	1,34			
	Male_Junior	141	2,73	1,32			
	Male_Senior	196	2,69	1,31			
18. How often do you try to hide how long you’ve been on-line?	Female_Freshman	70	2,36	1,33	2,268	0,03	None
	Female_Sophomore	69	2,17	1,20			
	Female_Junior	116	2,08	1,34			
	Female_Senior	57	2,14	1,30			
	Male_Freshman	56	2,57	1,48			
	Male_Sophomore	110	2,39	1,27			
	Male_Junior	141	2,59	1,29			
	Male_Senior	196	2,48	1,31			
19. How often do you choose to spend more time on-line over going out with others?	Female_Freshman	70	2,41	1,22	3,372	0,00	Male_Senior > Female_Senior
	Female_Sophomore	69	2,30	1,15			
	Female_Junior	116	2,37	1,31			
	Female_Senior	57	2,19	1,26			
	Male_Freshman	56	2,84	1,36			
	Male_Sophomore	110	2,72	1,36			
	Male_Junior	141	2,63	1,18			
	Male_Senior	196	2,84	1,40			
20. How often do you feel depressed, moody or nervous when you are off-line, which goes away once you are back on-line?	Female_Freshman	70	2,23	1,38	3,526	0,00	Male_Freshman > Female_Sophomore Male_Freshman > Female_Junior
	Female_Sophomore	69	2,14	1,24			
	Female_Junior	116	2,20	1,27			
	Female_Senior	57	2,26	1,41			
	Male_Freshman	56	2,96	1,28			
	Male_Sophomore	110	2,39	1,41			
	Male_Junior	141	2,72	1,43			
	Male_Senior	196	2,51	1,36			

In order to test hypothesis 5, the researchers also created another dummy variable to combine gender and school year (with eight levels; Female_Freshman,

Female_Sophomore, Female_Junior, Female_Senior, Male_Freshman, Male_Sophomore, Male_Junior, Male_Senior) to comprehend the effects on gender

on the survey items. The one-way ANOVA results demonstrated that fourteen survey items (except items 1, 7, 10, 13, 16 and 17) were statistically significantly differentiating around that new dummy gender-schoolyear variable validating hypothesis 5. To understand which group or groups significantly differ from the others, the researchers applied Dunnett C post-tests. As <Table 7> shows, out of fourteen survey items, only seven items unfolded differentiating group(s) (except 2, 3, 11, 12, 14, 15 and 18). When the differentiated groups were checked, male freshman differentiated eight times, male senior differentiated four times and male sophomore differentiated two times. When school year adjuncts to gender variable, male students still show higher scores for certain items, especially for freshman year where the university life adaptation started.

VI. Discussion and Conclusion

In this study, most participants identified their level of internet addiction as low or moderate. As indicated by the internet addiction test, most participants did not show signs of severe internet addiction and their internet usage levels were within a normal range. In addition, the highest and the lowest mean scores were obtained for the survey items 1 and 18 respectively. In other words, students frequently stay online longer than they planned but they do not tend to hide from others how long they have stayed online.

According to the gender comparison, male participants scored higher than female participants in the majority of survey items. This demonstrates that males are at higher risk of internet addiction than females, which is similar to the results obtained by Menon et al. (2018) and Li et al. (2019). Although more investigations are required to identify a clear

reason, one possible explanation can arise on different preference of internet usage by males and females. As reported by Lim and Meier (2011), males prefer to use internet for entertainment, such as multi-user online games, whereas females prefer social network services. Thus, using the internet for entertainment purpose might lead to a higher risk of internet addiction involving mental disorders such as internet gaming disorder.

The results obtained in this study also indicate that students from a technology dominant environment are more likely to be addicted to the internet than students from other environments. This could be due to different characteristics of the students. Compared to other environments, students of a technology dominant environment are more exposed to IT oriented education, which generally requires a high level of online-related skills. As such, this will naturally increase the duration of internet usage time and put students at a higher risk of internet addiction. In addition, regardless of the environment, students perceived that they stayed online longer than they planned but at a moderate level. This is consistent with the fact that most participants' internet addiction levels were either low or moderate. Thus, these findings suggest that the actual internet usage time and students' perceived internet usage time both influence the level of internet addiction.

There was no obvious difference observed for internet addiction by school year. According to Menon et al. (2018), older students seem to show a higher level of internet addiction, which is inconsistent with the results obtained in our study. One of the reasons for inconsistent results could be due to the university students' age in South Korea. As most of the male students have to complete approximately two years of military service during their university life, students in each school year will consist of mixed age groups.

In other words, different school year does not necessarily mean different age in South Korea. Thus, similar survey scores for each school year can be explained under this special context of South Korean students.

When gender and type of technology dominant environment variables were combined, the gender effect was still intact. This possibly indicates that the gender characteristic surpasses the IT related exposures or environment. In fact, Choi et al. (2019) also highlighted the gender variable having more influence on internet addiction than other variables used in their study.

When gender and school year variables were combined, freshman male students exhibited overall higher scores than other groups. The gender variable effect was still consistent and it appears to be prevalent in the freshman period. This implies that male students are more vulnerable to internet addiction during the school adaptation period and need a particular care. The possible relationship between internet addiction and school life adjustment has been also reported previously (Choi et al., 2019).

In short, our five hypotheses have been tested and validated. Although the third hypothesis was partially validated, it provided a significant meaning to the fifth hypothesis. This implies that certain variables should not be treated alone to unveil its true impact on the research target. The first, second and fourth hypotheses confirmed both singular and combined effects of their target variables. It was also revealed that one variable can be more predominant than the other. Indeed, all five hypotheses served their purpose and provided useful guidelines that can be considered for future studies.

6.1. Theoretical Implications

The results of our study indicate that gender and

environment variables are related to internet addiction. Although school year variable alone did not show any significant impact on internet addiction, it should be noted that combined variables of gender and school year revealed different levels of internet addiction. Previous studies have reported inconsistent results regarding the gender effect on internet addiction (Li et al., 2019; Menon et al., 2018; Mohammadkhani et al., 2017). As such, gender variable needs to be investigated in presence of other variables to clarify its impact in a broader perspective.

Our study results expand current understanding of gender effect and internet addiction. More importantly, our study suggests a possibility that more hidden variables can be identified by testing them in various combinations. In future, a map of gender and other combined variables can be completed to screen their effects on internet addiction and create safer learning environments.

6.2. Practical Implications

This study highlights various aspects of internet addiction and its associated factors. In particular, two important factors, gender difference and type of technology dominant environment, were related to internet addiction. These factors are possibly linked to the purpose of internet usage as well as actual and perceived internet usage times. This implies that adjusting the purpose of internet usage and managing internet usage times must be prioritized to reduce the gender gaps and the level of internet addiction. In particular, male students need more attention regarding their internet usage for entertainment purpose. Depending on male and female student ratio, it is also advised that the education provider gives appropriate guidelines to the students regarding the purpose and duration of internet usage for effec-

tive classroom management.

In addition, the gender variable can influence internet addiction by cooperating with other variables such as the type of technology dominant environment and school year. Male students during the freshman period need a particular attention and also classes with high number of such students should prepare an effective school adaptation process as a preventative measure for internet addiction. After all, identification and spontaneous management of gender and its associated variables will be essential in any places with the risks of internet addiction.

6.3. Limitation and Future Research

In future, further investigations are required for a deeper understanding of internet addiction among the university students. In order to identify the factors that induce the gender difference, detailed internet

usage patterns for males and females should be investigated respectively. This will involve separate survey questionnaires, adjusted for each gender, followed by statistical analysis. In addition, internet addiction levels can be assessed among different age groups in order to compare the results against the school year. Since this study implemented the convenience sampling which might have the disadvantage of sampling bias, the same study should be replicated in different universities to check if the observed results are due to onetime occurrence.

By speculating more factors associated with gender and internet addiction, it will be possible to gain a better understanding of its psychological mechanisms and create preventive measures. Moreover, future studies on internet and gender will contribute to the achievement of gender equality in the waves of upcoming digital era.

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