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The Impact of Internet Addiction on Depression among Korean Adolescent Middle and High School Students

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ABSTRACT

It is a well-known fact that Internet addiction adversely affects mental health of adolescents. This study was conducted to determine whether there is a difference in the experience of depression according to the level of Internet addiction. Participants included 73,238 middle and high school students from the Korean Youth Risk Behavior Web-based Survey (KYRBWS) conducted in 2010. The level of Internet addiction and the experience of depression were assessed using self-diagnosis questionnaires. Multiple logistic regression analysis was used to identify the association between Internet addiction and depression. High-risk and potential-risk Internet users were 1.61 times and 1.21 times more likely to experience depression, respectively, than normal Internet users. The increase in depression was more significant in girls students. Acknowledging the connection between Internet addiction and depression, the problem should be tackled from the perspective of school health by providing systematic Internet addiction prevention and treatment programs

Key words*: Addiction, Depression, Adolescent, Mental Health, Gender.*

1. INTRODUCTION

Adolescence is an important period when teenagers experience a range of physical and psychological changes and prepare for adulthood. Adolescents are considered to be physically healthy compared to other age groups, while being mentally and neuro-physiologically vulnerable to various addictions because of inaccurate judgment of situations or phenomena. Substance addictions, such as nicotine and alcohol addiction, and behavioral addictions, such as Internet addiction, are potential risks in adolescence [1], [2].

According to a recent survey on Korean adolescents' Internet use, 99.9% were using the Internet. Further, 98.1% of the Internet users visited an online site for leisure purposes. [3].

However, excessive Internet use causes too many negative effects to become as a means of teenage leisure. Among adolescents, excessive Internet use is known to cause social isolation and mental health problems, such as depression [4], unhealthy behaviors, such as low academic performance and lack of exercise [5], and changes in one's character, such as displaying aggression [6]. In addition, Internet addiction is also proven to have adverse effects on adolescents' intelligence. Internet-addicted adolescents recorded lower scores in the comprehension section of an intelligence test compared to

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unaffected adolescents [7]. More importantly, there is a link between Internet addiction and a decline in social intelligence, as comprehension tests reflect ethical judgments and reality testing [7].

In addition to the negative results mentioned above, Internet overuse could cause apathy, a sense of helplessness, and a weakened ability to distinguish reality from virtual reality in people's daily lives [8]. The more time people spent on the Internet, the more Internet tolerance is developed, which makes people spend even more time online. An increasing number of people were experiencing psychological and pathological symptoms. Meanwhile, depression is known to not only entail emotional symptoms, such as constant sadness, loneliness, emptiness, and loss of interest and pleasure, cognitive symptoms like self-deprecation, a sense of guilt and worthlessness, and a decline in thinking ability and attention, and physiological symptoms, such as insomnia and loss of appetite and weight, but is also related to damaged social relationships [9].

Depression is receiving increased attention as one of the most significant psychological diseases. According to a national survey of Korean adults in 2011, the rate of depression increased by 1.5 times compared to 2001, recording 6.7% in lifetime prevalence (5.6% in 2006) [10]. Depression is also an important problem for adolescents. In 2010, 37.4% (boys 32.7%, girls 42.6%) of Korean adolescents were experiencing depression and the depression prevalence of Korean high school students was higher than that of their American counterparts [11]. Further, people who have experienced depression in adolescence are known have a higher probability of developing depression in adulthood than those who have not [12]. Particularly, a study [13] found out that the top cause of death among Korean teenagers aged 10 to 19 years was suicide. It was also verified through various studies that depression was one of the factors that cause teen suicide [14-16]. Considering its prevalence and link to suicide, adolescent depression should be taken very seriously.

Therefore, utilizing the source data of the 2010 Korean Youth Risk Behavior Web-based Survey (KYRBWS), a national sample survey of middle and high school students conducted by the Korea centers for disease control and prevention, this study examines the impact of Internet addiction on depressive emotions in Korean adolescents. To date, many studies have identified related factors that affect depression in adolescents. Especially in Korea, where there is easy access to the Internet, the problems related to Internet use are increasing among adolescents. Although there are Korean studies on this topic, there is no nationally representative survey to explore the relationship between Internet use and depression.

The purpose of this study was to compare the levels of Internet use according to socio-demographic and health-related variables and to examine the relationship between the level of Internet use and depression. Considering the gender differences in depression, we analyzed the data based by gender.

2. METHODS

2.1 Study design

This study is a secondary analysis of the data collected from the 2010 KYRBWS (Approval Number: 11758), a longitudinal survey using a representative sample of South Korean adolescents conducted by the KCDC. A portion of the data from the large-scale study was analyzed in this study.

The KYRBWS is a government-approved statistical survey that has been conducted annually since 2005 to investigate health behaviors of Korean adolescents. In order to ensure the tool's validity and reliability, the KCDC comprises of an advisory board consisting of experts in various fields to examine and validate the survey tool every year. The tool has also been validated in previous studies [17].

2.2 Setting and sample

Based on the National Education Statistics by the Korean Educational Development Institute, the KYRBWS selected participants, using the multistage probability sampling method, from middle schools and high schools across the country. To be more specific, first, 16 areas were divided into 45 clusters according to the number of population. In the second stage, 400 middle schools and 400 high schools were selected from the 45 clusters using probability quota and a systematic sampling method. In the third stage, one class was randomly chosen from each sample school. The response rate was 97.7%, with 73,238 students (37,570 middle school students and 35,668 high school students), of the total 74,980 students submitting their answers. Among the participants, 52.4% were boys and 47.6% were girls. According to the stratified sampling, it was composed of 54.1% metropolitan cities, 40.5% medium and small cities, and 5.4% municipalities. The grades to which the students belonged followed a similar ratio (middle school: 16.4% first grade, 16.6% second grade, and 17.1% third grade; high school: 16.8% first grade, 16.5% second grade, and 16.5% third grade).

2.3 Ethical consideration

KYRBWS is a government approved statistical survey that has been conducted annually since 2005. The participants of the survey filled out an online questionnaire which guaranteed anonymity. Information about the survey (e.g., purpose, procedure, the amount of time required, how confidentiality will be maintained, and the right to withdraw from the study) was provided to the participants through pamphlets and videos.

When the participants visited the survey website, they first saw an opening page explaining the purpose of the survey. After giving informed consent, the participants were asked to click the "participate in the survey" button. The participants could enter the survey website using certified numbers for identity verification.

2.4 Measurements

The KYRBWS consists of 125 questions concerning 14 domains, such as smoking, drinking, physical activity, dietary habits, obesity and weight control, mental health, and so on.

This study included questions related to socio-demographic and health related variables, Internet addiction, and depression.

2.4.1 Socio-demographic and health-related variables

Seven questions about gender, age, academic performance, economic status, living with parents, subjective health status, and subjective stress perception were used to assess the socio-demographic and health-related variables. Gender (boys and girls) and living with parents (both, one, and none) were measured on a nominal scale. The other variables, except age, were measured on a 5-point Likert scale: Academic performance (1=low, 5=high), economic status (1=low, 5=high), subjective health status (1=very unhealthy, 5= very healthy), and subjective stress perception (1=hardly feel stressful, 5= feel very stressful). We eventually transformed these to 3 categories Table 1.

2.4.2 Internet addiction

The self-diagnostic questions about internet addiction, 24 questions in total, can be grouped into 6 factors, every question accounting for 4 points. Applying the evaluation standards defined in the guideline for the KYRBWS [11], the respondents were classified into 3 groups: high-risk, potential-risk, and normal Internet users. In the high-risk group were the students who received more than 52 points in total or who recorded more than 16 points in the first factor, more than 10 points in the third factor, and more than 12 points in the sixth factor at the same time. Those who received 48 to 52 points in total or who satisfied at least one of the following conditions, more than 14 points in the first factor, more than 9 points in the third factor, and more than 11 points in the sixth factor fell into the potential-risk group. Those received scores below 48 were classified in the group. Cronbach's alpha was .923.

2.4.3 Depression

Regarding the experience of depression, the respondents answered "yes" or "no" to a question asking whether they experienced constant sadness or despair to the extent of discontinuing daily routines for 2 consecutive weeks during the past 12 months.

2.5 Data collection

The survey was carried out in school media centers using computers from 1 to 30 September 2010 (additional survey period: 1 to 24 October 2010). Each participant was allowed to use the computer individually. Students in the same class participated in the survey at the same time. To prevent direct communication between the students, a screen was installed to separate them. A trained teacher from the school facilitated the survey.

2.6 Data analysis

To be in accordance with the real demographic composition, the data were weighted before being analyzed. For inferential statistical analyses, an alpha level of .05 was used and the analyses were stratified by gender.

A two-step analysis was conducted on the source data, provided in the form of SPSS data files by KCDC, using the SPSS 18.0 program.

First, descriptive analysis was conducted on total variables, such as the respondents' gender, age, academic performance, economic status, living with parents, subjective health status, subjective stress perception, Internet addiction, and experiences of depression. The results were presented in the form of frequency, percentage, and mean and standard deviation. In addition, a X^2 test or a t-test was implemented to verify the statistical significance of the differences in the level of Internet addiction and depression according to the socio-demographic characteristics and health-related variables

Second, to identify the influencing factors of depression, logistic regression analysis was conducted on boys and girls respectively, using the variables that were identified as significant from the X^2 or t-test as its control variables.

3. RESULTS

3.1 Socio-demographic and health-related variables

The average age of the boys and girls who participated in the study was 15.1 years. Regarding the recent 12-month's academic grades, 35.4% of the students said their grades were "high" and 37.5% replied "low." Regarding economic status, 33.0% of the boys and 26.6% of the girls responded "high." Most of the students were living with both their parents (87.6%), but 10.8% were living with one parent and 1.6% living without their parents. When asked of their subjective health status, 69.1% of the boys said they were "healthy" and 6.7% reported "unhealthy," while 58.3% of the girls said "healthy" and 9.6% reported "unhealthy."

For subjective stress perception, 37.7% of the boys and 50.7% of the girls said their stress level was "high."

Concerning Internet addiction, 3.9% of the boys and 1.9% of the girls fell into the high-risk Internet users group and 13.9% of the boys and 9.6% of the girls were classified as potential-risk Internet users. In addition, 32.7% of the boys and 42.6% of the girls reported they had experienced depression during the past 12 months Table 1.

Table 1. Socio-demographic and health-related variables of the participants based on gender

Characteristics	N (%)		
	Total (N=73,238)	Boys (n=38,391)	Girls (n=34,847)
Age (M±SD)	15.1±0.03	15.1±0.05	15.1±0.05
Academic performance			
High	25,951(35.4)	13,976(36.2)	11,975(34.5)
Average	19,651(27.1)	10,194(26.9)	9,457(27.2)
Low	27,636(37.5)	14,221(36.8)	13,415(38.3)
Economic status			
High	21,072(30.0)	12,238(33.0)	8,834(26.6)
Average	34,253(46.4)	17,061(44.0)	17,192(49.1)
Low	17,913(23.6)	9,092(23.0)	8,821(24.2)
Living with parents			
Both parents	59,077(87.6)	31,014(88.2)	28,063(86.9)

One parent	7,687(10.8)	3,844(10.2)	3,843(11.3)
Non parents	1,399(1.6)	684(1.5)	715(1.8)
Subjective health status			
Healthy	46,471(64.0)	26,339(69.1)	20,132(58.3)
Average	20,768(27.9)	9,429(24.2)	11,339(32.0)
Unhealthy	5,999(8.1)	2,623(6.7)	3,376(9.6)
Subjective stress perception			
High	32,094(43.8)	14,418(37.7)	17,676(50.7)
Average	29,669(40.5)	16,531(43.1)	13,138(37.6)
Low	11,475(15.6)	7,442(19.2)	4,033(11.7)
Internet addiction			
High- risk	2,196(3.0)	1,512(3.9)	684(1.9)
Potential- risk	8,722(11.9)	5,305(13.9)	3,417(9.6)
Normal	62,320(85.2)	31,574(82.3)	30,746(88.4)
Depression			
No	45,865(62.6)	26,025(67.3)	19,840(57.4)
Yes	27,373(37.4)	12,366(32.7)	15,007(42.6)

3.2 Internet addiction according to socio-demographic and health-related variables

The rate of Internet addiction showed statistically significant differences according to socio-demographic and health-related variables. Those with low academic performance, low economic status, not living with both parents, negative subjective health status, or high subjective stress perception were the ones who displayed the highest rates of high-risk Internet use Table 2.

Table 2. Internet addiction based on socio-demographic and health-related variables

Characteristics	Total n (%)				Boys n (%)				Girls n (%)			
	High risk group	Potential risk group	Normal group	χ^2or t (*p*)	High risk group	Potential risk group	Normal group	χ^2 or t (*p*)	High risk group	Potential risk group	Normal group	χ^2 or t (*p*)
Age(M±SD)	15.13±.05	15.33±.04	15.11±.03	48.50 (<.001)	15.25±.06	15.34±.05	15.13±.04	24.74 (<.001)	14.85±.09	15.32±.05	15.08±.05	33.45 (<.001)
Academic performance												
High	63(2.3)	274(10.4)	2,574(87.3)	59.30 (<.001)	43(3.0)	169(11.9)	1,851(85.1)	41.65 (<.001)	19(1.5)	105(8.6)	723(89.9)	23.29 (<.001)
Average	44(2.3)	225(11.6)	1,959(86.1)		30(3.0)	140(14.2)	848(82.8)		14(1.4)	84(8.8)	847(89.8)	
Low	123(4.1)	372(13.5)	2,787(82.5)		77(5.4)	220(15.6)	1,236(79.0)		34(2.7)	152(11.2)	1,551(86.2)	
Economic status												
High	55(2.5)	200(9.4)	1,851(88.1)	93.27 (<.001)	40(3.2)	128(10.4)	1,055(86.4)	69.84 (<.001)	14(1.6)	72(8.0)	796(90.4)	36.77 (<.001)
Average	86(2.5)	399(11.7)	2,939(85.8)		58(3.5)	242(14.3)	1,404(82.1)		27(1.6)	157(9.0)	1,534(89.4)	
Low	78(4.4)	272(15.3)	1,441(80.3)		52(5.7)	159(17.9)	697(76.5)		26(3.1)	112(12.6)	743(84.3)	
Living with parents												
Both parents	160(2.7)	674(11.4)	5,072(86.0)	27.16 (<.001)	109(3.5)	412(13.3)	2,579(83.2)	25.34 (<.001)	51(1.8)	261(9.1)	2,493(89.1)	9.42 (<.001)
One parent	29(3.7)	110(14.7)	629(81.5)		21(5.5)	64(17.5)	298(77.0)		8(2.0)	45(12.0)	330(86.0)	
Non parents	6(5.6)	19(1.2)	113(80.2)		4(7.8)	10(13.8)	53(78.4)		2(3.4)	8(14.6)	60(82.0)	
Subjective health status												
Healthy	100(2.1)	480(10.3)	4,066(87.6)	222.86 (<.001)	74(2.8)	310(11.8)	2,248(85.4)	178.35 (<.001)	25(1.2)	170(8.3)	1,817(90.5)	93.14 (<.001)
Average	71(3.6)	278(13.3)	1,727(83.2)		46(5.0)	158(16.9)	738(78.0)		25(2.3)	119(10.1)	988(87.6)	
Unhealthy	47(7.6)	113(19.6)	438(72.8)		30(11.0)	61(24.0)	170(65.0)		17(4.9)	52(16.1)	268(79.0)	
Subjective stress perception												
High	148(4.5)	485(15.0)	2,576(80.5)	209.39 (<.001)	93(6.3)	255(17.7)	1,092(75.9)	144.00 (<.001)	54(3.0)	229(12.6)	1,484(84.4)	120.37 (<.001)
Average	56(1.9)	302(10.2)	2,608(87.8)		44(2.7)	208(12.7)	1,400(84.6)		12(0.9)	93(7.1)	1,208(91.9)	
Low	15(1.3)	85(7.4)	1,047(91.3)		12(1.7)	66(8.9)	665(89.5)		2(0.6)	18(4.6)	382(94.8)	

χ^2 is 2nd Rao-Scott adjusted chi-square value in weighted analysis.

3.3 Depression according to socio-demographic and health-related variables

The rate of adolescents experiencing depression showed statistically significant differences according to every socio-demographic and health-related variable. Students were more likely to say they had experienced depression, when they were older, had lower academic grades, belonged to a lower economic group, did not live with their parents, perceived their own health status as unhealthy, or perceived their stress level as high Table 3

3.4 Effects of internet addiction on depression

The examination of the factors of adolescent depression revealed that every factor had significant influences. In particular, among high-risk internet users, boys and girls were 1.58 times and 2.24 times respectively more vulnerable to depression than normal Internet users. Among potential-risk Internet users, boys and girls were 1.17 times and 1.40 times respectively more likely to experience depression Table 4.

Table 3. Depression based on socio-demographic, health-related variables, and Internet addiction

Characteristics	Total n(%)			Boys n(%)			Girls n(%)		
	No	Yes	χ^2or t (p)	No	Yes	χ^2 or t (p)	No	Yes	χ^2 or t (p)
Age (M±SD	15.06±.04	15.32±.03	220.38 (<.001)	15.11±.04	15.37±.04	117.89 (<.001)	14.95±.05	15.22±.05	136.03 (<.001)
Academic performance									
High	17,334(67.0)	8,617(33.0)	206.95 (<.001)	9,867(70.5)	4,109(29.5)	89.06 (<.001)	7,467(62.9)	4,508(37.1)	114.20 (<.001)
Average	12,586(63.9)	7,065(36.1)		7,097(68.9)	3,097(31.1)		5,489(58.3)	3,968(41.7)	
Low	15,945(57.6)	11,691(42.4)		9,061(62.9)	5,160(37.1)		6,884(51.8)	6,531(48.2)	
Economic status									
High	13,818(65.4)	7,254(34.6)	274.94 (<.001)	8,481(68.7)	3,757(31.3)	107.41 (<.001)	5,337(60.9)	3,497(39.1)	177.05 (<.001)
Average	22,367(65.3)	11,886(34.7)		12,027(70.2)	5,034(29.8)		10,340(60.5)	6,852(39.5)	
Low	9,680(53.8)	8,233(46.2)		5,517(59.8)	3,575(40.2)		4,163(47.4)	4,658(52.6)	
Living with parents									
Both parents	37,986(64.3)	21,091(35.7)	120.87 (<.001)	21,433(68.7)	9,581(31.3)	40.23 (<.001)	16,553(59.4)	11,510(40.6)	77.52 (<.001)
One parent	4,279(55.2)	3,408(44.8)		2,414(61.6)	1,430(38.4)		1,865(48.8)	1,978(51.2)	
Non parents	751(50.6)	648(49.4)		412(57.1)	272(42.9)		339(44.2)	376(55.8)	
Subjective health status									
Healthy	31,368(67.5)	15,103(32.5)	661.48 (<.001)	18,646(70.3)	7,693(29.7)	212.45 (<.001)	12,722(63.7)	7,410(36.3)	415.43 (<.001)
Average	11,955(57.6)	8,813(42.4)		6,074(64.1)	3,355(35.9)		5,881(52.1)	5,458(47.9)	
Unhealthy	2,542(42.0)	3,457(58.0)		1,305(47.6)	1,318(52.4)		1,237(37.6)	2,139(62.4)	
Subjective stress perception									
High	14,167(44.3)	17,927(55.7)	2969.19 (<.001)	7,065(48.7)	7,353(51.3)	1399.84 (<.001)	7,102(40.6)	10,574(59.4)	1459.87 (<.001)
Average	21,737(73.4)	7,932(26.6)		12,446(75.0)	4,085(25.0)		9,291(71.4)	3,847(28.6)	
Low	9,961(86.2)	1,514(13.8)		6,514(86.6)	928(13.4)		3,447(85.3)	586(14.7)	
Internet addiction									
High- risk	939(42.9)	1,257(57.1)	244.90 (<.001)	727(48.6)	785(51.4)	144.43 (<.001)	212(29.8)	472(70.2)	174.49 (<.001)
Potential- risk	4,785(54.5)	3,937(45.5)		3,256(60.6)	2,049(39.4)		1,529(44.6)	1,888(55.4)	
Normal	40,141(64.5)	22,179(35.5)		22,042(69.3)	9,532(30.7)		18,099(59.4)	12,647(40.6)	

χ^2 is 2nd Rao-Scott adjusted chi-square value in weighted analysis.

Table 4. Factors affecting depression

Variables (ref.)	Categories	OR(95%CI)		
		Total	Boys	Girls
Age		1.05 (1.04-.07)	1.05 (1.05-1.08)	1.05 (1.03-1.07)
Academic performance (ref. high)	Low	1.29 (1.23-.35)	1.23 (1.16-1.31)	1.36 (1.28-1.45)
	Average	1.13 (1.07-.20)	1.07 (1.00-1.15)	1.20 (1.11-1.31)
Economic status (ref. high)	Low	1.05 (0.99-.12)	1.02 (0.93-1.11)	1.07 (0.99-1.16)
	Average	0.85 (0.81-.89)	0.83 (0.78-0.89)	0.84 (0.79-0.90)
Living with parents (ref. both parents)	Non parents	1.37 (1.19-.58)	1.32 (1.07-1.64)	1.38 (1.15-1.66)
	One parent	1.21 (1.14-.28)	1.16 (1.06-1.26)	1.26 (1.16-1.36)
Subjective health status (ref. healthy)	Unhealthy	1.71 (1.59-.83)	1.53 (1.37-1.69)	1.79 (1.62-1.98)
	Average	1.19 (1.14-.24)	1.07 (1.00-1.14)	1.26 (1.19-1.33)
Subjective stress perception (ref. low)	High	6.89 (6.43-.40)	6.33 (5.76-6.95)	6.93 (6.22-7.71)
	Average	2.20 (2.05-.37)	2.16 (1.98-2.37)	2.19 (1.95-2.45)
Internet addiction (ref. Normal group)	High- risk	1.61 (1.44-1.81)	1.58 (1.39-1.80)	2.24 (1.81-2.76)
	Potential-risk	1.21 (1.13-1.28)	1.17 (1.08-1.27)	1.40 (1.27-1.54)

ref.: reference

4. DISCUSSION

So far, a number of researchers interested in adolescent depression have conducted various studies revealing several relevant factors of depression among adolescents (e.g., health risk behaviors, female gender, poor economic status, compliance with chronic illness, stress, negative parenting, and poor peer relationships) [18], [19]. Building on these efforts, we have identified that Internet addiction, a recently highlighted problem among adolescents, is a significant cause of depression. Even after adjusting the factors already known to affect depression, high-risk and potential-risk Internet users were 1.61 times and 1.21 times respectively more likely to experience depression than normal Internet users.

This phenomenon was more noticeable in girls. In girls, high-risk Internet users and potential-risk Internet users showed 2.24 times and 1.40 times higher risks respectively than normal Internet users. Moreover, Wei's study of 722 people, at an average age of 21.8 years, suggested that women experienced depressive emotions more than men, even though they spent less time playing online games and had a shorter history of online gaming than their male counterparts, which means that women are more vulnerable than men to depression caused by Internet use [20].

In the Korean socio-cultural context, the country has a significantly high prevalence of teen Internet addiction, which

bears the risk of depression. According to the 2010 KYRBWS, 14.9% (3.0% in the high-risk group and 11.9% in the potential-risk group) of the surveyed adolescents were addicted to the Internet. The rate was 12.4% in another survey on the state of Internet use among adolescents from the age of 9-19 years by the National Information Society Agency [21].

The connection between Internet use and depression has already been proven through various studies of college students [6], [22], adults [23], and teenagers [24]. In addition, concerning the mechanism through which Internet addiction affects depression, several studies have concluded that those addicted to the Internet have different interactions with real people [25]. However, it has not been clearly determined as to what comes first, Internet addiction or depression. While Yen [26] and Cho [27] regarded depression as a preceding factor of Internet addiction, Cheung's study suggested vice-versa [28]. However, Park's study, based on a path analysis, suggested that problematic Internet use was a predictor of depression, but simultaneously, depression was also a predictor of problematic Internet use [29]. This indicates that even though further studies are required to answer the question of what comes first, it is indisputable that Internet addiction and depression are correlated. Therefore, it is of vital importance to take advantage of such findings in real classrooms.

This study was analyzed based on gender because it is known to effect depression. However, there were no remarkable differences between boys and girls. Based on the results, the depression rate of girls was higher than that of boys.

The rate of high-risk Internet users was higher in boys than girls. Among the high-risk Internet users, the proportion of having depression was higher in girls than boys. In summary, girls are more likely to be depressed when exposed to the Internet. Considering the fact that Internet addiction effects depression among adolescents, there are important implications for education policies.

Nevertheless, Korean schools are not currently dealing with this problem from the perspective of school health, nor are they providing any systematic Internet addiction prevention or treatment programs, except basic education. Even though the nation is in a situation where the rate of Internet addiction among teenagers is higher than in any other age group and where nearly 30% of teenagers are experiencing depression [30], there are no polices or guidelines on school-centered programs for Internet addiction prevention, treatment education, and counseling. Currently, some institutions including the Korea Internet Addiction Center, an online counseling website, I Will Center, Seoul city's Internet addiction prevention counseling center, and some local mental health centers are providing services related to Internet addiction. However, such institutions require teenagers to voluntarily visit the place to get help after identifying their problem behavior. The prevalence of Internet addiction and the number of teenagers experiencing depression are increasing every year, and the connection between school violence and Internet addiction is being reported. Therefore, it is urgent to start providing Internet addiction prevention and treatment programs for middle and high school students.

One of the limitations of the study is concerning whether the subjects had experienced depression, as a dependent variable, which was examined by asking their “subjective perception of depressive emotions” not by checking whether they were diagnosed with depression by clinical doctor. In Korea, however, it is difficult to reveal mental illnesses in public. Moreover, Korean adolescents do not actively seek psychological diagnosis and treatment for their mental illnesses. Therefore, using the “subjective perception of depressive emotions” as a dependent variable can be regarded as meaningful. Nonetheless, there is a need for in-depth studies on whether clinically diagnosed depression is related to Internet addiction. Another limitation of the study is that it did not include sufficient confounding or extraneous factors that may effect depression, such as family history and school bullying, because it is a secondary analysis.

Despite such limitations, the study is of significant importance. First, it empirically demonstrated that Internet addiction influences depression by using data from a large-scale survey representing Korean adolescents. Further, this study is meaningful in that it studied not only Internet addicts, but potential Internet addicts. Second, the study confirmed the need to make efforts, led by school nurses or community nurses, to assist Internet-addicted students and provide intensive treatment programs for them.

5. CONCLUSION

The study confirmed the fact that there was a significant association between Internet addiction and depression in Korean adolescents. High-risk Internet users and potential-risk Internet users were 1.61 times and 1.21 times respectively more at a higher risk of experiencing depression than normal internet users. Such tendency was more noticeable in girls students than in boys students. The results of this study, which is representative of the Korean population, are valid enough to be generalized.

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