

The Difference in Comorbidities and Behavioral Aspects between Internet Abuse and Internet Dependence in Korean Male Adolescents

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Objective This study examined the differences in psychiatric comorbidities and behavioral aspects in accordance with the severity of Internet addiction in male adolescents.

Methods One hundred and twenty-five adolescents from four middle and high schools in Seoul were enrolled in this study. The subjects were divided into non-addict, abuse, and dependence groups according to a diagnostic interview by psychiatrists. The psychiatric comorbidities and behavioral aspects of subjects were evaluated through psychiatric clinical interviews based on the Diagnostic and Statistical Manual of Mental Disorders (4th edition), the Children's Depression Inventory, the State-Trait Anxiety Inventory, the Internet Addiction Test, and a self-reported questionnaire about behavioral aspects.

Results The psychiatric comorbidity distributions were significantly different in the abuse and dependence groups, particularly in terms of attention-deficit hyperactivity disorder and mood disorder items. The Children's Depression Inventory, the State-Trait Anxiety Inventory, and the Internet Addiction Test scores were also significantly different among the three groups. There were significant differences in 10 of the 20 items of the Internet Addiction Test between the non-addict, abuse, and dependence groups. There were significant differences in seven items between the non-addict and abuse groups, but no differences between subjects in the abuse and dependence groups. Significant differences were observed in three items between the abuse and dependence groups, but there were no significant differences between the non-addict and abuse groups. In terms of behavioral aspects, scores for abusive, sexual, and decreased social interest behaviors were highest in the dependence group, and lowest in the non-addict group. However, the behavioral aspects of decreased interpersonal relationships did not show this difference between groups.

Conclusion This study suggests that there are differences in psychiatric comorbidities and behavioral aspects between adolescent males with characteristics of Internet abuse and Internet dependence. **Psychiatry Investig 2014;11(4):387-393**

Key Words Internet abuse, Dependence, Comorbidity, Behavioral aspects.

INTRODUCTION

To date, there are no clear definitions of Internet addiction, and Internet addiction as a distinct entity within the topic of addictive disorders continues to be a subject of debate. Although there are several criteria and tests for Internet addiction, the

Internet Addiction Test (IAT) developed by Young¹ is the most widely-used assessment tool. The IAT is based on the criteria for pathological gambling described in the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV),² suggesting that Internet addiction is a form of behavioral addiction.

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Several studies have shown that behavioral and substance addictions have many similarities in diverse aspects.³ To evaluate Internet addiction, Anderson and Fortson used modified criteria in a study modeled after the substance-related disorders from the DSM-IV, to evaluate Internet addiction.^{4,5} Using these criteria, Internet addiction is defined as an addictive disorder similar to substance use disorders. Their research implied that, as in cases of substance abuse, Internet addiction may be differentially diagnosed as either abuse or dependence, with distinctive clinical characteristics. However, because that study did not conduct patient interviews, but rather made a diagnosis based on paper surveys, the authors were not able to determine exact psychiatric comorbidities for each patient.

A wealth of research regarding Internet addiction has focused on the psychiatric symptoms and psychiatric comorbidities of the condition.⁶⁻⁸ There have been consistent findings regarding the relationship between depressive symptoms and Internet addiction,⁸⁻¹¹ and many researchers have reported that a range of psychiatric diseases coexist with Internet addiction.^{12,13} An accurate assessment of comorbidity is an essential part of understanding the etiology of Internet addiction, because it is obvious that Internet addiction and psychiatric comorbidity affect each other even though their causal relationship remains unclear. Clinically, accurate assessment of comorbidity is important for appropriate treatment, as well as to predict the prognosis of addicts. Recent studies have indicated that Internet addiction has heterogeneous features in psychiatric comorbidities and behavioral aspects according to gender, age, and the severity of addiction.^{9,14} However, these have been small-scale studies or studies that used only self-reported questionnaires without diagnostic interviews by psychiatrists. If it is clear that abuse and dependence group is showing the difference in terms of psychiatric comorbidities based upon accurate diagnosis by psychiatrists, we will be able to plan the research and therapeutic approach for internet addiction more precisely.

Based on the criteria provided by Fortson,⁴ the current study aims to distinguish Internet abuse and dependence by conducting diagnostic interviews, and to determine the differences between the two groups in terms of psychiatric comorbidities and behavioral aspects. The authors hypothesized that there are differences in psychiatric comorbidities and behavioral aspects between male adolescents with tendencies of Internet abuse and dependence.

METHODS

Participants

Data were obtained from four local middle and high schools. Included in this study were subjects who were identified as In-

ternet addicts both by IAT scores over 40^{1,15,16} as well as by psychiatric diagnosis. Age- and gender-matched subjects who were identified as non-addicts were included as the control group. For the non-addict group, diagnostic interviews about Internet addiction and questionnaires were conducted, but psychiatric comorbidities of subjects were not evaluated in this group. The subjects and their parents provided written informed consent after receiving a full explanation of the study, in accordance with procedures approved by the Institutional Review Board of Seoul St. Mary's Hospital.

Materials

Internet use

The degree of Internet use was assessed by two methods. First, all participants took the IAT. The IAT is a 5-point Likert scale composed of 20 items, with each item rating the degree of preoccupation, compulsive use, behavioral problems, emotional changes, and impact on general functioning related to Internet use.¹ A higher score indicates a more severe Internet addiction. Second (and the more important part in this study), five psychiatrists conducted interviews using a modified version of the substance abuse and dependence criteria in the DSM-IV. Our criteria for Internet abuse and dependence are shown in Table 1.

Psychiatric comorbidities

Psychiatrists assessed the psychiatric comorbidity of subjects with the Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Health Disorders-IV (SCID). In addition, all subjects performed the Korean version of the Children's Depression Inventory (CDI)¹⁷ and the State-Trait Anxiety Inventory (STAI)¹⁸ for objective assessment of the severity of comorbidities.

Self-reported questionnaire

Internet addiction research typically uses a 40-item self-reported questionnaire about Internet usage.¹⁹ In this study, four items related to behavioral aspects were added to the questionnaire for additional analysis: 1) Are you becoming more aggressive in the cyber world? (abusive), 2) Are your conversations in the cyber world more sexual in nature? (sexual), 3) Are you interested in your school life? (decreased social interest), 4) What is your relationship with friends? (decreased interpersonal relationship)

All four items were rated on a 5-point Likert scale.

Analysis of data

Continuous variables were analyzed using an independent sample analysis of the variance (ANOVA) with post hoc mul-

Table 1. Criteria for Internet abuse and dependence

Internet Abuse: When responses to any item of A as well as both B and C are “yes,” a definite diagnosis of abuse is made

- A. Has the client experienced the following?
 1. Recurrent failure to meet important responsibilities due to Internet use
 2. Recurrent Internet use in situations when it is likely to be physically dangerous
 3. Recurrent legal problems arising from Internet use
 4. Continued usage despite recurrent problems aggravated by Internet use
- B. These symptoms have occurred within a 12-month period
- C. Client has never met the criteria for dependence

Internet Dependence: When any three responses to A and B are “yes,” a definite diagnosis of dependence is made

- A. Has the client experienced the following?
 1. Tolerance; Behavior related to Internet dependence. Developed tolerance symptoms, such as increased Internet use to get the same desired feeling, or a decrease in desired feeling with the same amount of use.
 2. Withdrawal; Experienced withdrawal symptoms in reaction to decreased Internet use that have either interrupted important areas of life functioning or have led to use of similar objects to relieve symptoms.
 3. Using the Internet more or for longer periods than intended
 4. Desire to or unsuccessful efforts to cut down on Internet use
 5. Considerable time spent in using or recovering from the effects of use
 6. Important social, work, or recreational activities given up because of use
 7. Continued use despite knowledge of problems caused or aggravated by use
- B. Have these symptoms been present during the same 12-month period?

Table 2. Demographic characteristics of subjects

	Non-addict		Abuse		Dependence	
	(N=63)		(N=21)		(N=41)	
	N	%	N	%	N	%
School						
Middle school	39	61.9	16	76.2	32	78.0
High school	24	38.1	5	23.8	9	22.0
Age (mean±SD)	15.95±1.29		14.76±0.83		15.02±0.82	

multiple comparisons and Bonferroni adjustments. The categorical data was analyzed using Fisher’s exact tests.

RESULTS

Internet abuse and dependence

Table 2 lists demographic data about the subjects. In the addict group, 21 and 41 subjects were classified as belonging to the Internet abuse group and Internet dependence group, respectively.

Psychiatric comorbidities

Several psychiatric comorbidities were identified among the Internet addicts. In the total addict group, the most common comorbidity was depressive disorder (38.7%), followed by attention-deficit hyperactivity disorder (35.5%), mood disorders other than depressive disorder (12.9%), anxiety disorder (8.1%), substance use disorder (4.8%), impulse control disorder

(4.8%), and other (14.5%). When the addict group was subdivided into abuse and dependence groups, there were further differences in the frequency of comorbidities between the two groups (Table 3). The total comorbidity rate was higher in the dependence group (82.9%) than in the abuse group (81.0%), but the difference was not statistically significant. The only significant difference between the two groups was in the frequency of attention-deficit hyperactivity disorder. The combination of depressive disorder and other mood disorders into a single category of “mood disorders”, revealed a significant difference between the two groups as attention-deficit hyperactivity disorder (Figure 1).

Differences in IAT, CDI, and STAI scores between each group

Figure 2 shows the differences in CDI, trait anxiety, state anxiety, and IAT scores between the groups. The CDI, trait anxiety, and IAT scores increased in the order of non-addict, abuse, and dependence groups, but the state anxiety scores did not. There were significant differences between each group in the CDI items regarding negative thoughts of self and the future, low self-esteem, suicidal ideation, insomnia, loss of appetite, loss of interest in activities, and difficulty with peer relationships. In particular, there were significant differences in low self-esteem, negative thoughts of the future, and suicidal ideation between the abuse and dependence groups.

Table 3. Comorbidities of subjects in the Internet abuse and dependence groups

	Abuse		Dependence		χ^2	P
	N	%	N	%		
Attention-deficit hyperactivity disorder	11	52.4	11	26.8	3.96	<0.05
Depressive disorder	5	23.8	19	46.3	2.97	0.07
Other mood disorders	1	4.8	7	17.1	1.87	0.17
Anxiety disorder	2	9.5	3	7.3	0.09	0.56
Other comorbidities	3	14.4	12	29.3	1.83	0.15
No comorbidity	4	19.0	7	17.1	0.04	0.55

Fisher's exact test was used for statistical comparisons

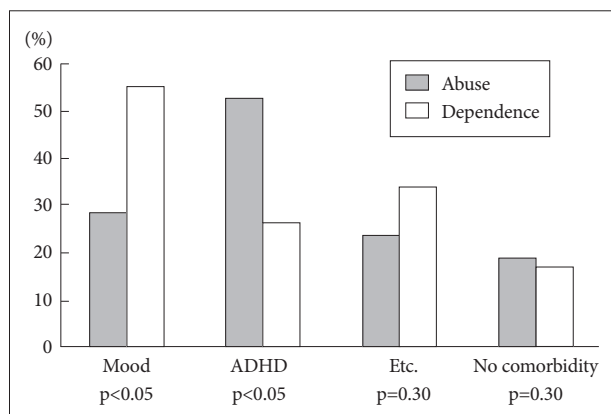


Figure 1. Comorbidities of Internet abuse and dependence groups. Fisher's exact test was used for statistical comparisons. ADHD: attention-deficit hyperactivity disorder.

Differences in IAT items

Responses to 10 of the 20 IAT items showed significant differences among the non-addict, abuse, and dependence groups. Seven items were significantly different between the non-addict and abuse groups, but not between the abuse and dependence groups. On the other hand, for three items, there were significant differences in the responses of the abuse and dependence groups, but not between the non-addict and abuse groups (Table 4).

Differences in behavioral aspects

Three items regarding abusive, sexual, and decreased social interest were significantly different between the three groups. However, responses regarding decreased interpersonal relationships were not significantly different (Table 5).

DISCUSSION

The results of the present study suggest that there are differences in psychiatric comorbidities between subjects in the Internet abuse and dependence groups. In the dependence group, mood disorders, particularly depressive disorder, were a more common comorbidity than attention-deficit hyperactivity disorder.

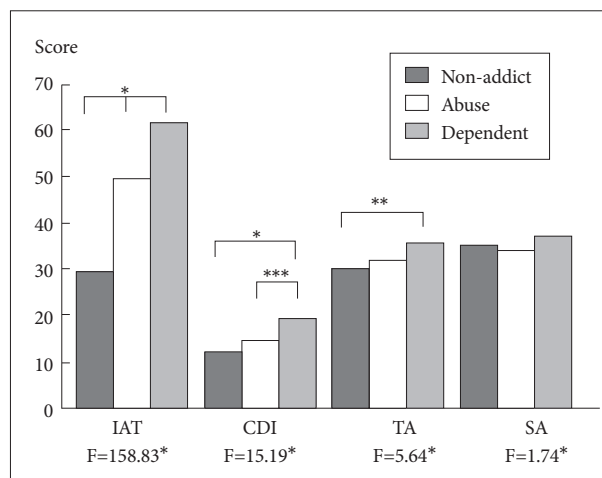


Figure 2. Differences in the CDI, TA, SA and IAT scores between the non-addict, abuse, and dependence groups. ANOVA with post hoc multiple comparisons and Bonferroni adjustments was used for analysis. *p<0.001, **p<0.01, ***p<0.05. IAT: internet addiction test, CDI: the Children's Depression Inventory, TA: trait anxiety, SA: state anxiety, ANOVA: analysis of variance.

order. On the other hand, in the abuse group, attention-deficit hyperactivity disorder was the most common comorbid disorder. Core symptoms of attention-deficit hyperactivity disorder are "being easily bored" and "having an aversion to delayed rewards."^{20,21} Internet behavior is characterized by rapid response and immediate rewards, possibly reducing feelings of boredom or providing immediate stimulation and rewards for subjects with attention-deficit hyperactivity disorder. The Internet also offers social support, potential achievement, the pleasure of control, and a virtual world in which adolescents can escape from emotional difficulty in the real world.²²⁻²⁴ Accordingly, it appears reasonable that depressive adolescents are more likely to use the Internet to alleviate depression, and that they may suffer more deleterious effects from heavy Internet use. This creates a vicious cycle that may lead to a state of dependence on the Internet falling within the spectrum of Internet addiction.²⁵

The significant differences in the CDI and STAI scores among the non-addict, abuse, and dependence groups suggest

that subjects in the three groups have different levels of depression and anxiety. However, the causality between depression, anxiety, and Internet addiction has not been identified in this study.

20 items of the IAT could be subdivided into three groups, according to differences in scores of non-addict, abuse, and dependence. The three subgroups of the IAT indicate that some items are able to identify each stage of addiction (although

Table 4. Differences in Internet Addiction Test items between non-addict, abuse, and dependence groups

Items	Mean (SD)			Multiple comparison		
	Non-addict	Abuse	Dependence	F	p	
1) Staying online longer than intended	2.15 (0.85)	3.24 (0.89)	3.93 (1.02)	49.04	<0.001	Non-addict < Abuse < Dependence
2) Neglecting household chores	1.34 (0.60)	2.81 (0.68)	3.37 (0.97)	98.10	<0.001	
3) Preferring the excitement of the Internet	1.58 (0.90)	2.76 (0.77)	3.50 (0.98)	55.41	<0.001	
4) Forming new relationships with online users	2.00 (1.11)	3.33 (1.06)	4.02 (0.91)	49.93	<0.001	
6) Grades or school work suffer	1.45 (0.76)	2.52 (1.25)	3.29 (1.42)	36.03	<0.001	
11) Anticipating going online again	1.42 (0.82)	2.29 (1.01)	2.95 (1.26)	29.19	<0.001	
12) Fear of life without the Internet	1.44 (0.64)	2.00 (0.77)	2.98 (1.21)	37.63	<0.001	
16) Saying to yourself “just a few more minutes”	1.71 (0.80)	2.52 (1.03)	3.50 (1.27)	27.64	<0.001	
18) Trying to hide how long you’ve been online	1.27 (0.55)	2.33 (0.97)	3.21 (1.35)	43.72	<0.001	
19) Spending more time online than going out with others	1.31 (0.50)	2.38 (0.92)	3.44 (1.16)	75.27	<0.001	
5) Others complain to you about the amount of time you spend online	2.16 (0.99)	3.62 (0.97)	4.10 (0.94)	54.30	<0.001	Non-addict < Abuse = Dependence
7) Checking email before doing something else	1.39 (0.89)	2.19 (1.40)	1.88 (1.19)	5.37	0.006	
8) Reduced job performance or productivity	1.31 (0.62)	2.57 (1.12)	2.76 (1.37)	30.02	<0.001	
9) Being defensive or secretive when anyone asks you what you do online	1.32 (0.70)	2.05 (0.86)	2.37 (1.28)	16.09	<0.001	
10) Using soothing thoughts of the Internet to block out disturbing thoughts about life	1.40 (0.64)	2.52 (1.03)	2.83 (1.20)	33.09	<0.001	
13) Snapping, yelling, acting annoyed if someone bothers you while you are online	1.63 (0.94)	2.57 (1.16)	3.20 (1.27)	26.50	<0.001	
17) Failing attempts to cut down on use	1.37 (0.63)	2.38 (1.07)	2.86 (1.62)	29.19	<0.001	
14) Losing sleep due to late-night log-ins	1.37 (0.63)	1.95 (1.16)	2.71 (1.31)	22.77	<0.001	Non-addict = Abuse < Dependence
15) Feeling preoccupied with the Internet when offline	1.06 (0.25)	1.33 (0.80)	2.17 (1.34)	21.39	<0.001	
20) Feeling depressed, moody, nervous when you are offline	1.15 (0.42)	1.57 (0.75)	2.64 (1.29)	32.21	<0.001	

ANOVA with post hoc multiple comparisons and Bonferroni adjustments was used for analysis. ANOVA: analysis of variance

Table 5. Distribution of behavioral aspects questionnaire responses from non-addict, abuse, and dependence groups

Questionnaire	Group	Answer (%)					P
		Never	Infrequently	Sometimes	Frequently	Always	
Abusive	Non-addict	50.8	38.1	11.1	0.0	0.0	<0.001
	Abuse	38.9	22.2	38.9	0.0	0.0	
	Dependence	17.9	14.3	39.3	21.4	7.1	
Sexual	Non-addict	69.8	25.4	4.8	0.0	0.0	0.01
	Abuse	55.6	33.3	11.1	0.0	0.0	
	Dependence	32.1	39.3	21.4	3.6	3.6	
Decreased social interest	Non-addict	11.1	30.2	47.6	9.5	1.6	0.02
	Abuse	11.1	16.7	44.4	5.6	22.2	
	Dependence	3.6	14.3	42.9	21.4	17.9	
Decreased interpersonal relationships	Non-addict	22.2	60.3	17.5	0.0	0.0	0.15
	Abuse	33.3	55.6	11.1	0.0	0.0	
	Dependence	21.4	39.3	35.7	3.6	0.0	

Fisher’s exact test was used for statistical comparisons

some items may be useful only for identifying normal or addict subjects), whereas some items are able to identify the level of dependence in subjects. In this study, sleep disorders, mood changes, and preoccupation were prominent in the dependence group, but there were no significant differences in these items between the non-addict and abuse groups.

Abusive behavior, sexual behavior, and decreased social interest were more severe in the abuse group than in the non-addict group, and were most severe in the dependence group. These results are consistent with the results of previous studies.²⁶⁻²⁸ Decreased interpersonal relationships, however, did not show the same pattern as the other behavioral aspects. It appears that subjects in the abuse group have better relationships with others than subjects in the non-addict group. This could be explained in two ways. First of which, the survey did not differentiate the terms 'on-line' friends and 'off-line' friends and this resulted in the expansion of the term. In order to clarify this, we will have to clearly distinguish the term, 'off-line' friends from 'on-line' friends before the evaluation. Secondly, this also may be explained by previous reports suggesting that the Internet tends to compensate for the communication difficulties of introverted and withdrawn people.²⁹ Information regarding an individual's level of interpersonal relationships before the individual demonstrates characteristics of Internet abuse or dependence should be acquired to accurately assess the effect of the Internet on interpersonal relationships.

This study has some limitations. The first limitation is that the psychiatric comorbidities of subjects in the non-addict group were not evaluated. Due to this limitation, our results do not show the differences in psychiatric comorbidities between the non-addict and addict groups. This point, however, does not detract from the primary purpose of comparing psychiatric comorbidities between Internet abuse and dependence groups. The second limitation is that this study was conducted as a cross-sectional study. A longitudinal prospective study is needed to identify the causality of Internet addiction and psychiatric comorbidities.

In conclusion, there are differences in psychiatric comorbidities and behavioral aspects between male adolescents with tendencies of Internet abuse and dependence. These findings suggest that Internet abuse and dependence have a different core psychopathology. Based on these results, in the future research, we will be able to conduct a large-scale study about the biological and psychological mechanism of internet abuse and dependence. And, in terms of the treatment point of view, if the causality of psychiatric comorbidity is found in internet abuse and dependence group, it will be able to help to prevent the recurrence or worsening of it.

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