The effect of gaming disorder on suicidality: Focusing on the mediating effect of social support and self-esteem[*]

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Abstract

The purpose of this study is to find out the role of social support and self-esteem in the relationship between gaming disorder and suicidality of college students. A survey and analysis were conducted on 1,154 students in a four-year university in Gyeonggi-do of Korea. With analysis of the Internet Gaming disorder scale, 162 people (14%) were subjected to gaming disorder and 992 (86%) were non-gaming disorder. The hypothesis of this study was verified as follows. First, college students with gaming disorder have higher suicidality and lower social support and self-esteem than those with non-gaming disorder. Second, gaming disorder of college students have a positive correlation with suicidality, while gaming disorder will have a negative correlation with social support and self-esteem. Third, social support and self-esteem mediate the relationship between gaming disorder and suicidality of college students. These results show that social support and self-esteem can act as protective factors. The results are very meaningful in that they have verified the high risk of suicidality of college students with gaming disorder. It is suggested, when college students show signs of Internet gaming addiction, a more active prevention for suicidality should be considered as they can become a suicidal high risk group.

Keywords: Gaming Disorder, Suicidality, Social Support, Self-esteem

Major classifications: Health Science, Public Health, Health Policy and Economy.

1. Introduction

1.1. Smartphone overdependence

The smartphone overdependence risk group aged 3 to 69 in 2020 was 23.3%, the highest since the 2013 survey. The percentage of smartphone overdependence risk groups was 35.8% among teenagers aged 10 to 19, and adults in their 20s

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were 30.4%, the highest among age groups. 95.6% of teenagers and 93.1% of those in their 20s were using the game (Ministry of Science and ICT, 2021). It is suggested that the high percentage of overdependence risk groups and the high rates of game utilization in adolescents and adults in their 20s require more research for interest and intervention in this subject.

Comparing Korea's suicide status, another social problem, with OECD countries, Korea's suicide rate in 2019 was 24.6 per 100,000 people, 2.4 times higher than the average suicide rate (11.0 people) of OECD member countries. The number of suicide deaths in 2020 is 13,195, and the suicide rate reaches 25.7%. Looking at the suicide rate by age in 2020, the suicide rate by teens was 6.5 people, 21.7 people in their 20s, and 27-30.1 people in their 30s to 60s. The suicide rate was high in the elderly, with 38.8% in their 70s and 62.6% in their 80s and older. Looking at the gender suicide rate in 2020, there were 35.5 males and 15.9 females. Men were more than twice as high as women. The occupational groups with the highest number of suicide deaths were "students, housework, unemployed" (4,965 people, 50.9%), followed by "service workers and sales workers" (1,258, 12.9%), "office workers" (1,165, 11.9%), and "simple labor workers" (966, 9.9%). The causes of suicide in 2020 were 38.4% of psychiatric problems, 25.4% of economic life problems, 17.0% of physical disease problems, 7.0% of family problems, and 3.9% of workplace or work problems.

Among the age groups, college students have the second highest proportion of smartphones overdependence after adolescents and show the highest number of suicide deaths among the occupational groups. In addition, since psychiatric disorders, that is the main cause of suicide, coexist in the smartphone overdependence group, the risk of suicide can also be considered high in the smartphone overdependence group. It can be assumed that the online gaming disorder group, which can be considered as one category of smartphone overdependence, will also have a high tendency to commit suicide. Therefore, this study attempted to identify the characteristics of college students' gaming disorders and suicidality, identify psychosocial factors affecting the relationship. Therefore, this study will use the results to intervene in suicide prevention in college students with gaming disorder.

1.2. Theoretical background

DSM-5 (2013) published Internet gaming disorder as candidates for formal disorder in the appendix, and ICD-11 (2018) officially registered gaming disorders. In 2025, Korea will decide on whether to register gaming disorder in Korea's disease classification system (KCD). Government ministries and the game industry, which have interests in registering gaming disorders in Korea's disease classification system, are still arguing. In this study, the Internet gaming disorder group was selected using the Korean Version of Internet Gaming Disorder Scale (K-IGDS), which defined Internet gaming disorder according to the DSM-5. Internet gaming disorder was defined as a case where there is a problem in daily life due to excessive use of games, and the symptoms of withdrawal, tolerance appear, and the gaming behavior is uncontrollable.

Addictive behaviors were also linked to increased suicidal ideation and suicide attempt in previous studies. Several studies have found higher rates of suicidal ideation and suicide plan among excessive game users compared to normal users. These population samples most often include adolescents or young adults. Moreover, problematic game use was significantly associated with lifetime suicidal plan (AOR 3.77, 95% CI 1.50–9.48) after controlling for comorbid psychiatric disorders as well as age, gender, and residential area. However, there was no significant association of problematic game use with suicidal ideation and suicide attempt (Park et al., 2017).

Using the diagnostic criteria of DSM-5 for Internet gaming disorder, Um et al. (2014) investigated the differences in stress, suicide-related behavior, and Internet addiction-related symptoms according to Internet gaming time. Suicidal ideation and suicide plans were significantly higher in the Internet gaming group than in the general use group, but there was no significant difference in suicide attempts. In a study by Lee and Kang (2020), Internet game addiction and suicidal ideation of college dormitory students showed a positive correlation. In a study of high school students, Ko and Lee (2013) reported that the higher the Internet addiction, the higher the suicidal ideation, and that depression had a partial mediating effect in the study between Internet addiction and suicidality. Jeon et al. (2012) reported the effect of stress on suicidality through Internet addiction and depression. It was reported that the youth high-risk group for Internet gaming addiction had significantly higher suicidality, depression, and stress responses than the normal group.

There are reports that social support acts as a protective factor in preventing suicide (Kim & Lee, 2008; Clara et al., 2003). Parents and families were also found to be the most influential protective factors for adolescents' suicidal ideation rather than friends or teachers, who are social supporters of adolescents (Kim, 2008). It has been reported that social support has a moderating effect on smartphone addiction and life stress (Shim, Kim, & Lee, 2016). On the other hand, adolescents who have experienced suicidal ideation have low self-esteem (Cole, Protinsky, & Cross, 1992), and the Internet addiction or smartphone overdependence group has lower self-esteem than the general user group (Kim, Kim, Kim, Park, & Park, 2017).

Research on the relationship between gaming disorder and suicidality in adults in Korea is insufficient. Gaming addiction of college students is reported high, and the suicide rate is also high. When the relationship between the two is examined, it will be an important basic data for the direction of intervention, discovery of target groups, and policy development. Based on the results of previous studies above, we will examine the relationship between the gaming disorder and suicidality and verify how self-esteem and social support affect suicidality in the gaming disorder group, and use it as an intervention factor for suicide prevention in college students with gaming disorder.

2. The purpose of the study and the research questions

This study attempted to understand the role of social support and self-esteem in the relationship between gaming disorder and suicidality of college students. Based on the results of this study, it was intended to provide basic data on the development of prevention and counseling programs and intervention methods in daily life so that gaming disorder of college students do not lead to suicidality. The hypothesis of this study is as follows.

First, college students with gaming disorder will have higher suicidality and lower social support and self-esteem than those with non-gaming disorder.

Second, gaming disorder of college students will have a positive correlation with suicidality, while gaming disorder will have a negative correlation with social support and self-esteem.

Third, social support and self-esteem will mediate the relationship between gaming disorder and suicidality of college students.

3. Research Method

3.1. Subjects

A survey and analysis were conducted on 1,154 students enrolled in a four-year university in Gyeonggi-do. Women accounted for 79.1% of all respondents, four times more than men due to the health care universities. By grade, it was evenly distributed from 1st to 4th graders (Table 1).

Table. 1: Sociodemographic Characteristics of Subjects

variable		Frequency (percentage %)
gender	male	241(20.9)
	female	913(79.1)
grade	1	312(27.0)
	2	241(20.9)
	3	284(24.6)
	4	317(27.5)
age	mean (SD)	22.16(2.0)
total		1,154(100)

3.2. Research Instruments

3.2.1. The Korean Version of Internet Gaming Disorder Scale (K-IGDS)

This is a measure that Cho and Kwon (2017) translated and validated the Internet game disorder scale that Lemmens et al. (2015) developed and validated according to the DSM-5 diagnostic criteria. K-IGDS consists of nine sub-factors: obsession, withdrawal, tolerance, loss of control, continuous use, lie, escape, and harm to daily life despite problems, and loss of interest in daily life in accordance with the diagnostic criteria of internet game disorder presented in DSM-5. Each factor consists of three questions, so that is a total of 27 questions. Each factor evaluates the experience on a six-point Likert scale, ranging from 0 points (not at all), 1 point (about 1-4 times a year), 2 points (about 5-11 times a month), 3 points (about 1-3

times a week), 4 points (more than once a week), and 5 points (about every day or almost every day). In the study of Lemmens et al. (2015), the internal consistency of the entire scale (Cronbach's α) was .94, and the internal consistency of Cho and Kwon (2017) was .96. The internal consistency of this study was .952. In this study, based on the 48 cut-off scores proposed by Cho and Kwon (2017), it was classified as a 'gaming disorder group' when it is 48 points or higher and as a 'non-gaming disorder group' when it is less than 48 points.

3.2.2. Mini-International Neuropsychiatric Interview-Plus Suicidality

The Mini-International Neuropsychiatric Interview-Plus (MINI-Plus) is a structured interview instrument developed in the United States and Europe in 1998 for the diagnosis of mental disorders on major I and 2 axes of the 4th Edition of Diagnostic and Statistical Manual of Mental Disorders (DSM-IV, 2013) (Lecrubier et al., 1997; Sheehan et al., 1998). MINI-Plus showed Kappa .70 in the most diagnoses in accordance with the structured clinical interview for DSM (SCID-I) (Sheehan et al., 1997). In Korea, Yoo et al. (2006) standardized the Korean version of the MINI-Plus. In this study, MINI-Plus's suicidality scale was used. Suicidality was evaluated as yes in at least one of the six items, and suicide risk was evaluated as the sum of weights of 1 to 10 points for six items. The weight is 1 point if you think it's better to die or want to die over the past month, 2 points if you want to harm yourself, 6 points if you thought about suicide, 10 points if you planned to commit suicide, 10 points if you tried to commit to suicide. A total of 0 points is classified as no suicide risk, 1 to 5 points are classified as low suicide risk, 6 to 9 points are classified as medium suicide risk, and 10 or higher are classified as high suicide risk. The total score is distributed from the lowest 0 to the highest 33.

3.2.3. Social support

The Multidimensional Scale Perceived Social Support (MSPSS) developed by Zimet, Dahlem, Zimet, and Farley (1988) and adapted by Shin and Lee (1999) was used. It is three dimensions: family support, friend support, and major other support, and consists of a total of 12 questions, that is 4 questions for each dimension. The 5-point Likert scale (1 point: Not at all to 5 points: Very much so), and the distribution of scores is 12 points to 60. The higher the score, the higher the social support. In a study by Zimet et al. (1988), the total Cronbach's α was found to be .88, and in a study by Shin and Lee (1999), the reliability was also high at .89, respectively. In this study, the internal consistency of the social support scale (Cronbach's α) was high at 925.

3.2.4. Self-esteem

The Self-Esteem Inventory of Rosenberg (1965) was used. It consists of a Likert 4-point scale with 10 questions. That is 5 positive and 5 negative questions. The higher the total score is, the higher is the level of self-esteem. In this study, the internal consistency (Cronbach's α) of the self-esteem scale was high at .869.

3.3. Data analysis

In this study, the analysis was conducted using the SPSS 21.0 program for statistical analysis of the collected data. First, the difference between the gaming disorder group and the control group was analyzed by calculating the mean and standard deviation of the variables. Second, Pearson's correlation analysis of variables was performed. Third, through PROCESS macro proposed by Hayes and Scharkow (2013), the mediating effect of social support and self-esteem in the relationship between game overdependence and suicidality was verified. Fourth, the statistical significance of the mediating effect was confirmed using the bootstrapping.

4. Result

4.1. Characteristics of variables in the gaming disorder group and the non-gaming disorder group

In the Korean version of the Internet Gaming Disorder Scale, based on the 48 cut-off score proposed by Cho and Kwon (2017), it was classified as a 'gaming disorder group' if it is 48 points or higher and a 'non-gaming disorder group' if it is less than 48 points. As a result, 162 people (14%) were subjected to gaming disorder and 992 (86%) were non-gaming disorder. As a result of analyzing the differences in the degree of gaming disorder with a t-test, suicidality, social support, and self-esteem between the gaming disorder group and the non-gaming disorder group, both groups showed significant differences (Table 2).

Table 2: Results of frequency analysis of subjects

	gaming disorder (n=162) M(SD)	non-gaming disorder (n=992) M(SD)	total	min.	max.	t
gaming disorder	66.57(18.74)	29.99(4.96)	35.12(15.22)	27	153	-51.52***
suicidality	4.35(7.44)	2.80(5.33)	3.01(5.69)	0	33	-3.23***
social support	45.38(8.66)	48.22(7.38)	47.82(7.63)	12	60	4.42***
self esteem	27.07(5.83)	29.04(5.58)	28.77(5.66)	10	40	4.15***

**p<.01, ***p<.001

4.2. Correlation between gaming disorder, suicidality, social support, and self-esteem

As a result of conducting correlational analysis between variables, the degree of gaming disorder of respondents showed a significant positive correlation with suicidality ($r=.131$, $p<0.01$). The degree of gaming disorder showed significant negative correlation with social support and self-esteem ($r=-.174$, $p<0.01$, $r=-.155$, $p<0.01$). Suicidality also showed significant negative correlation with social support and self-esteem ($r=-.239$, $p<0.01$, $r=-.307$, $p<0.01$). Social support and self-esteem showed a significant positive correlation ($r=.497$, $p<0.01$) (Table 3).

Table 3: correlation analysis of major variables

	gaming disorder	suicidality	social support	self esteem
gaming disorder	1			
suicidality	.131**	1		
social support	-.174**	-.239**	1	
self esteem	-.155**	-.307**	.497**	1

**p<.01, ***p<.001

4.3. The mediating effect of social support between gaming disorder and suicidality

In order to verify the mediating effect of social support in the influence of gaming disorder on suicidality, the analysis was conducted using Process Macro Model 4 of SPSS, and the results are presented in Table 4. As a result of verifying the significance of each route, gaming disorder have a significant negative effect on social support (B=-0.087, β=-.174, t=-5.991, p<.001), a significant positive effect on suicidality (B=0.034, β=.092, t=3.181, p<.01). Social support has a significant negative effect on suicidality (B=-0.166, β=-.223, t=-7.712, p<.001).

Table 4: The mediating effect of social support between gaming disorder and suicidality

	Path		B	β	se	t		p	LLCI	ULCI
gaming	→	social support	-0.087	-.174	0.015	-5.991	***	0.000	-0.116	-0.059
gaming	→	suicidality	0.034	.092	0.011	3.181	**	0.002	0.013	0.056
Social support	→	suicidality	-0.166	-.223	0.022	-7.712	***	0.000	-0.209	-0.124

**p<.01, ***p<.001

Bootstrapping was used to verify the significance of the indirect effect of social support in affecting the tendency of gaming disorder to commit suicide (Shrout & Bolger, 2002). Bootstrapping was performed by repeatedly extracting 5,000

times the partial mediation of the path from gaming disorder to suicidality through social support, and the results of the analysis are presented in Table 4.

As a result of the analysis, in the case of a path from gaming disorder to suicidality through social support, it was found to be positively significant because it did not contain 0 in the 95% confidence interval of indirect effects (B=0.039, CI [0.023~0.058].

Table 5: The mediating effect of social support on suicidality

Independent Variable	Mediating Variable	Dependent Variable	Effect	BootSE	BootLLCI	BootULCI
gaming	social support	suicidality	0.039	0.009	0.023	0.058

4.4. The mediating effect of self-esteem between gaming disorder and suicidality

In order to verify the mediating effect of self-esteem in the influence of gaming disorder on suicidal suicidality, the analysis was conducted using Process Macro Model 4 of SPSS, and the results are presented in Table 5. As a result of verifying the significance of each route, gaming disorder have a significant negative effect on self-esteem (B=-.058, β=.155, t=-5.339, p<.001, significant positive effect on suicidality (B=.032, β=.085, t=3.013, p<.01). Self-esteem has a significant negative effect on suicidality (B=-.295, β=-.294, t=-10.38, p<.001).

Bootstrapping was used to verify the significance of the indirect effect of social support in affecting the tendency of gaming disorder to commit suicide (Shrout & Bolger, 2002). Bootstrapping was performed by repeatedly extracting 5,000 times the partial mediation of the path from gaming disorder to suicidality through social support, and the results of the analysis are presented in Table 5.

Table 6: The mediating effect of self-esteem between gaming disorder and suicidality

			B	β	se	t		p	LLCI	ULCI
gaming	→	self-esteem	-0.058	-0.155	0.011	-5.339	***	0.000	-0.079	-0.037
gaming	→	suicidality	0.032	0.085	0.011	3.013	**	0.003	0.011	0.053
self-esteem	→	suicidality	-0.295	-0.294	0.028	-10.38	***	0.000	-0.351	-0.24

**p<.01, ***p<.001

As a result of the analysis, in the case of a path from gaming disorder to suicidality through self-esteem, it was found to be positively significant because it did not contain 0 in the 95% confidence interval of indirect effects (B=0.046, CI [0.027~0.068].

Table 7: The mediating effect of self-esteem on suicidality

Independent Variable	Mediating Variable	Dependent Variable	Effect	BootSE	BootLLCI	BootULCI
Gaming	Self-esteem	suicidality	0.046	0.01	0.027	0.068

4. Conclusion and implications

The purpose of this study is to find out the role of social support and self-esteem in the relationship between gaming disorder and suicidality of college students. The hypothesis of this study is verified as follows. First, college students with gaming disorder have higher suicidality and lower social support and self-esteem than those with non-gaming disorder.

Second, gaming disorder of college students have a positive correlation with suicidality, while gaming disorder will have a negative correlation with social support and self-esteem. Third, social support and self-esteem mediate the relationship between gaming disorder and suicidality of college students.

There is a report that the suicidal thoughts of high-risk groups using smartphones are higher than that of ordinary users, and depression increases due to psychological factors, leading to suicide (Lee 2014). In addition, it was found that there was a statistically significant correlation between smartphone addiction and suicidal thoughts index (Kim, & Hwang, 2015). There are studies on the relationship between Internet addiction or smartphone addiction, and suicide. But there are few studies on gaming disorder and suicide, so the results of this study are very meaningful in that they have verified the suicidality of college students with gaming disorder. There are many studies on risk factors in the relationship between gaming disorder and suicidality. This study shows that social support and self-esteem can act as protective factors. In future studies, it is necessary to focus on positive emotions and resilience that can act as protective factors to prevent suicide in the gaming disorder group.

In this study, the characteristics of Internet games were not considered, but if in consideration of the characteristics of various Internet games the study is performed, richer practical implications could be drawn. With the results of this study, when college students show signs of Internet gaming addiction, a more active prevention for suicidality should be considered as they can become a suicidal risk group. Measures should be prepared so that the gaming disorder group can receive preemptive diagnosis and counseling so that it does not lead to suicide accidents, suicide plans, and suicide attempts. In addition, it seems efficient to implement policies that can reach various connected problems at once through the linkage between the government's smartphone overdependence policy and suicide prevention policy.

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