Original article

The relationship between online game addiction and aggression, self-control and narcissistic personality traits

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Abstract

Objectives. − This study aimed to explore the relationship between online game addiction and aggression, self-control, and narcissistic personality traits, which are known as the psychological characteristics linked to "at-risk" populations for online game addiction.

Method. − A total of 1471 online game users (males 82.7%, females 17.3%, mean age 21.30 ± 4.96) participated in this study and were asked to complete several self-report measures using an online response method. Questionnaires included demographic information and game use-related characteristics of the samples, the online game addiction scale (modified from Young's Internet addiction scale), the Buss−Perry aggression questionnaire, a self-control scale, and the narcissistic personality disorder scale.

Results. − Our results indicated that aggression and narcissistic personality traits are positively correlated with online game addiction, whereas self-control is negatively correlated with online game addiction ($p < 0.001$). In addition, a multiple regression analysis revealed that the extent of online game addiction could be predicted based on the person's narcissistic personality traits, aggression, self-control, interpersonal relationship, and occupation. However, only 20% of the variance in behavioral consequences was explained with the model.

Conclusion. − An interesting profile has emerged from the results of this study, suggesting that certain psychological characteristics such as aggression, self-control, and narcissistic personality traits may predispose some individuals to become addicted to online games. This result will deepen our understanding of the "at-risk" population for online game addiction and provide basic information that can contribute to developing a prevention program for people who are addicted to online games.
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Keywords: Online game addiction; Aggression; Self-control; Narcissistic personality traits

1. Introduction

Since the first massive multiplayer online role-playing game (MMORPG) was launched in Korea in 1995, the number of games and participants in these online games has increased significantly. MMORPGs are the latest Internet-only gaming experience, and these are typically represented by large, sophisticated, detailed and evolving worlds based in different narrative environments [12,31]. The common characteristic of MMORPGs is that in virtual communities players can assume any role they desire, collaborate with other players in the game to succeed in even more complex goals and accomplish missions of a fairly aggressive nature. Players have the power to talk online, make friends and conduct transactions involving real or virtual assets. The entertaining, interactive and real-time online games have become "killer applications" on the Internet, and these are the primary reasons some teenagers spend hours every day playing these games [31].

However, as the popularity of the online games has grown, so have concerns over their excessive use. The phenomenon of

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"online game addiction" has widely spread over recent years and the clinical evidence to support the validity of this new syndrome is mounting, although researchers are not yet in agreement as to whether online game addiction is a legitimate mental disorder in the same category as pathological gambling [21]. In reflecting such an observation, there comes AMA report that the American Psychiatric Association is considering video game addiction, including addiction to online games, a disorder [1].

Due to the increased awareness that online game addiction is a legitimate concern, efforts to explain why and how people are deeply involved in these games have become important research issues. Some previous studies have suggested that individual psychological characteristics (including personality traits) may predispose certain individuals to overuse the Internet, and past research has chiefly examined the effects of shyness, anxiety, loneliness, depression, and self-consciousness on the level of Internet use so far [7,8,17,25,33]. However, little has been researched about the characteristics linked to "at-risk" populations with such a dependence upon "online games," especially of aggressive nature, which is one of the important subcategories of Internet addiction. Therefore, in this study we tried to explore the relationship between online game addiction and psychological characteristics such as aggression, self-control, and narcissistic personality traits. Each of these factors is expected to affect or be affected by one's gaming activities. To select these three factors, aggression was first identified as one of the factors because evidence supporting the hypotheses that violent game playing is related to aggression has been mounting in many past studies [9,11,13,29]. Even though the directionality (cause–effect relationship) of the two factors has not been identified, a study with Korean high school students indicated that students who report excessive Internet use are characterized by irritability, aggressiveness, and impulsivity [23]. In addition, the correlational results indicate that more aggressive children are drawn to violent games, rather than their aggression being a result of the violent game activity [11]. Second, a narcissistic personality trait was considered to be important for the understanding of the online game addiction process. One of the consensuses reached among online game addicts is that the main attractive feature of MMORPGs is its system of goals and achievements. As you play, your character advances by gaining experience points, "leveling-up" from one level to the next while collecting valuables and weapons and becoming wealthier and stronger. In this social setting, excellent players receive "the recognition and attention of others" and gain power and status [21,26]. Considering all this, the possibility that people with narcissistic personality traits will use the access to numerous relationships which is possible on the net as a means to gain an admiring audience is plausible. Third, it is further found that game addiction among young people is related to their weak self-control and discipline, and game addicts are weaker at controlling their emotions than are average Internet users [23]. In addition, some previous studies have suggested that less self-control is related to various types of addictive behaviors, including Internet addiction [18,23].

Grounded in these and other findings reported in the literature on online game participation, this study examined online game use patterns and addiction-related psychological profiles among Koreans. In particular, we developed three research hypotheses:

H1: The higher the level of aggression, the higher the likelihood that one will be addicted to online games.
H2: The more self-control the subjects have, the less likely they will be addicted to online games, especially those games with violent contents.
H3: The more narcissistic personality traits the subjects have, the more likely that they will be addicted to online games.
RQ1: To what extent are aggression, self-control, narcissistic personality traits, and the quality of interpersonal relationships related to online game addiction?

2. Method

2.1. Participants and procedure

An advertisement for research participation was posted on the official home page of WOW – world of warcraft (www.worldofwarcraft.co.kr), Lineage (www.lineage2.co.kr), and Mabinogi (www.mabinogi.com) for several days in June 2006. As a reward, the participant was eligible for 5–20 dollar-equivalent gift coupons when he or she completed the survey. The total number of participants who got gift coupons was 14. Because the surveys were conducted at three of the most popular online game sites, the participants can be regarded as a representative sample of online game users in Korea. The total number of participants was 1713. However, in the case of questionnaires completed by participants having the same IP address, the second record was excluded since they were regarded as an overlapping response. The records which failed to be filled out completely or appropriately were also excluded from the analyses. As a result, the final number of participants was 1471 including 1216 males (82.7%) and 255 females (17.3%). We obtained an online form of informed consent from the participants. The Ethical Committee of Severance Hospital approved the study protocol.

2.2. Questionnaire and measurement scales

We used the "Survey on Internet Use" which was composed of five sections: questionnaires regarding demographic information and game use-related characteristics of the samples, the online game addiction scale, an aggression scale, a self-control scale, and a narcissistic personality disorder scale.

2.2.1. Demographic information

We investigated the general information about the responders such as age, sex, occupation, and the patterns of Internet or online game use. We also inquired about their

interpersonal relationships by using the sum of scores obtained from three questions about the quality of their peer relationships (What do you think about your peer relationships?), their relationships with family members (What do you think about your relationship with family members?) and their levels of social anxiety (Do you feel discomfort when you spend time with someone other than family members?). These questions were created by the current investigators. The Likert scale scores of the questions about relationships with peer and family members ranged from 1 to 5 points with higher points suggesting better interpersonal relationships. The Likert scale scores of the level of social anxiety ranged from 1 to 4, and as the points declined the responder showed a tendency to lack self-confidence in front of other people and to avoid contact with others.

2.2.2. The online game addiction scale

The online game addiction scale was introduced by Whang [32], and it was modified from Young's Internet addiction scale [36] to measure the degree of online game addiction tendency. The online game addiction scale has 20 items associated with online game use, including psychological dependence, compulsive use, and withdrawal, as well as the related problems of school or work, sleep, family, and time management (for each item, a graded response is selected from 1 = "not at all" to 5 = "always"). The total score was in the range of 20−100, and a higher score implies a tendency toward addictive usage. The Cronbach's α of the scale in our study was 0.90.

2.2.3. The Buss−Perry aggression questionnaire

We used this questionnaire to measure aggression and hostility. The questionnaire consisted of 29 items which were scored along a five-point Likert scale. The Likert scale provides an overall score, and it has four subscales: physical aggression, verbal aggression, anger, and hostility. We only considered the total score in this study. The higher the total score, the greater the severity of the aggression [4].

2.2.4. Self-control scale

The self-control scale used in this study was reorganized from the scale originally developed by Gottfredson and Hirschi [10] (Cronbach's α, 0.74). It comprised a total of 20 questions, with 10 questions reflecting the degree of pursuing long-term satisfaction and the remaining 10 questions reflecting the degree of pursuing immediate satisfaction. All 20 items were ranked by the respondents using a five-point Likert scale. The last 10 items (item number 11−20) were reverse-scored to calculate the total scores. A higher total score indicated a higher level of self-control.

2.2.5. The narcissistic personality disorder scale (NPDS)

The NPDS [14] was used to assess the narcissistic personality traits of the participants. Respondents were asked to rank their agreement with a series of 18 statements reflecting the characteristics of the narcissistic personality trait (Cronbach's α, 0.68). A total of 18 items was ranked by the respondents

using a four-point Likert scale and a higher score implied a tendency toward narcissistic personality traits. This scale was significantly correlated with the narcissistic personality inventory [24] by Ruskin and Hall, which is a scale used in the evaluation of narcissistic traits worldwide ($r = 0.49$, $p < 0.01$) [19].

2.3. Statistical analysis

We performed all statistical analyses using SAS for Windows. We carried out one-way ANOVA for the categorical variables and correlation analysis with the online game addiction scale for the continuous independent variables. Finally, a stepwise multiple regression analysis was performed to explore significant predictors of online game addiction scale. The independent variables for inclusion were those showing statistically significant association with online game addiction scale from the ANOVA and correlation analysis conducted above.

3. Results

General information and a survey of characteristics of online game playing of participants are listed in Table 1. Most of the participants were students (68.8%), worker (21.3%), and unemployed (9.9%). The mean amount of time spent on the game per day was 313.09 min. The number of respondents playing Mabinogi was greatest ($N = 736$, 50.0%). The average money spent for online games was $30.90 per month, and the

Table 1
Demographic and general characteristics of the participants

	N (%) or mean ± SD
Age	21.30 ± 4.96
Sex	
Male	1216 (82.7)
Female	255 (17.3)
Occupation	
None	145 (9.9)
Student	1013 (68.8)
Worker	313 (21.3)
The online game subjects play most frequently	
World of warcraft	495 (33.7)
Lineage 2	53 (3.6)
Mabinogi	736 (50.0)
Other	187 (12.7)
Favorite aspect of playing	
Leveling and building up their character	652 (44.3)
Feeling superior to others	181 (12.3)
Grouping and interacting with other people	577 (39.2)
Earning money by selling items	16 (1.1)
Killing time	45 (3.1)
Average amount of game time (min/day)	313.09 ± 219.33
The number of players one regularly played with online	8.12 ± 12.44
Average amount of money spent for game (dollars/month)	30.90 ± 5.27
Online game addiction scale score (20−100)	62.93 ± 13.12
Aggression	47.02 ± 11.86
Self-control	64.75 ± 9.16
Narcissistic personality trait	42.83 ± 7.62

average number of game characters with whom each participant played while gaming was 8.12. The average online game addiction scale score was 62.93 ± 13.12.

Results in Table 2 show the differences of online game addiction scale scores according to sex and occupation using ANOVA. This revealed that online game addiction scale score was not significantly correlated with sex, but the unemployed scored significantly higher than the other two groups ($p < 0.001$).

As shown in Table 3, correlation analysis was conducted to examine correlation coefficient (r) between online game addiction scores and various continuous independent variables. These results show that narcissistic personality traits ($r = 0.36$, $p < 0.001$) and aggression ($r = 0.35$, $p < 0.001$) scores were positively related with the online game addiction scores. On the other hand, self-control ($r = -0.33$, $p < 0.001$) and social relationship scale scores ($r = -0.16$, $p < 0.001$) were negatively related with online game scale score.

A stepwise multiple regression analysis was performed using the independent variables of job, narcissistic personality traits, aggression, self-control, and interpersonal relationship which showed significant correlation with the online game addiction score from ANOVA or Pearson's correlation analysis. The results in Table 4 indicated that the general model was significant ($F = 60.29$, $p < 0.001$). The R^2 for the overall model indicated that approximately 20% of the variance of online gaming addiction was accounted for by the above five independent variables. Of these variables, the severity of the narcissistic personality traits was the most useful. Higher narcissistic personality traits, higher aggression, poor self-control, poor interpersonal relationship, and no occupation were associated with higher online game addiction score. To exclude serious collinearity problems, we performed a collinearity analysis. Because all the variances of inflation factor were below 5 and all the values of tolerance were above 0.5, there were no serious collinearity problems.

4. Discussion

This study primarily focused on exploring individual psychological characteristics such as aggression, self-control and narcissistic personality traits and how these variables are related to online game addiction in Korean online game players. The findings of this research support all the hypotheses we posed. Our results indicate that aggression and narcissistic personality traits are positively correlated with online game addiction, whereas self-control is negatively correlated with online game addiction.

Regarding interpersonal relationships with family and friends, those with low scores on the interpersonal relationship scale scored higher on the online game addiction scores (Tables 3 and 4). From this result, it can be inferred that a high dependency on online games was associated with interpersonal difficulties and stress in reality. According to Whang's study [31], Internet addicts would feel interpersonal relationships in reality are stressful, and they would try to shun others and engage in Internet use as an alternative to relationships in real life. Internet addicts are usually attracted by social interaction and communication activities such as MMORPG or online chat because of these tendencies. Overall, our results have supported previous findings of a significant relationship between the level of Internet addiction and the psychological states such as loneliness and social anxiety [13,20,31]. However, it is still unclear as to whether a poor interpersonal relationship is a cause or a consequence of excessive online game addiction. It could be that the addictive use of online games is associated with a decline in participants' communication with family members in the household and a decline in the size of their social circles, and because of this they become socially isolated and are no longer able to socialize in a normal way.

In this study, it was found that the level of aggression was positively related with the game addiction score (Tables 3 and 4). Like other computer games, there are lots of aggressive components in MMORPGs. There has been great suspicion and speculation on whether the increase in player killing in the game world would facilitate the gamers to act violently in the real world [31]. Although some studies have reported that the amount of violent video game play is correlated with self-reported levels of aggression, other studies conclude that aggression has not been associated with online game killing of virtual opponents like in MMORPGs [9,11,28,29]. However, individual differences were not considered enough in this research, and the assumption was made that the effects of playing games on all people will be the same, which might not necessarily be the case. Research on vulnerable groups has shown that some children and adolescents are more susceptible to the influence of the media than others are [9]. For example, personality factors such as temperament also appear to have a mediating role, and some research suggests that high-trait aggressive men are most affected by the computer game violence [3]. Other studies also support that there was a bi-directional causal effect in which viewing violence engendered aggression and aggression engendered violence viewing [2]. Although the directionality of the aggression and the online game addiction is not revealed, the aggression scale used in this study reasonably reflects the trait of aggression, and it can be postulated that those with an aggressive trait will be engaged in an online game to gratify their latent aggressive impulses, which are not acceptable in the real world but which can be resolved in the virtual world of online games.

Table 2
Differences of online game addiction scale scores according to various characteristics of participants

	Mean ± SD	F	p-Value
Sex		−1.63	0.104
Male	62.67 ± 12.68		
Female	64.28 ± 14.68		
Occupation		15.73	<0.001
None ($N = 145$)	67.92 ± 12.91		
Student ($N = 1013$)	62.93 ± 13.14		
Worker ($N = 313$)	60.60 ± 12.51		

Table 3
Correlation coefficient (r) between online game addiction scale scores and various characteristics of participants

	Online game addiction	Age	Social relationship	Narcissistic traits	Self-control
Age	0.02				
Social relationship	−0.16*	−0.16*			
Narcissistic traits	0.36*	−0.01	−0.09*		
Self-control	−0.33*	0.14*	0.12*	−0.48*	
Aggression	0.35*	−0.12*	−0.12*	0.57*	−0.49*

*p < 0.01.

A narcissistic personality trait was positively correlated with the online game addiction score (Tables 3 and 4). This finding seems to be inconsistent with the previous reports by Craig that low self-esteem and a negative evaluation about themselves were good predictors of Internet addiction and the amount of time spent online [22]. The tangible explanation for this finding is the unique characteristics of MMORPGs, which are clearly different from the other features of Internet. In MMORPGs, leveling-up and getting items, recognition and admiration from other players are the major attraction for many of those who play [21]. In light of the concept that individuals with narcissistic personality traits are preoccupied with a grandiose sense of self-importance, fantasies of success, power and that they require excessive admiration and recognition as presented in DSM-IV, it can be reasonably predicted that people with a greater narcissistic personality trait will collect valuable items and upgrade their skills to advance their players in the game [26]. Because they value wealth and strength in the game world as much as they do in the real world, they tend to have a strong inclination to resort to any possible means for the sake of increasing their wealth and strength inside the game, and they also invest much more time than other players. For some people with a narcissistic personality trait, MMORPGs may be reinforcing because it bolsters self-esteem as well as provides status and respect with a lower chance of rejection. Therefore, narcissistic people are likely to have a high chance of being addicted to online games.

The hypothesis that self-control will be negatively correlated with the online game addiction score was also supported (Tables 3 and 4). Self-control is defined as an ability to resist an impulse, drive, or temptation to perform an action. In the present study, the concept of "delayed gratification" was adopted to define "self-control." In previous studies by Oh, a negative correlation was found between Internet addiction

and self-control [23]. That is, Internet addiction among young people is related to their lack of self-control, and Internet addicts are weaker at controlling their emotions than average Internet users [22,23]. This result indicates that increased self-control enables people to control their use of the Internet to a reasonable degree, thereby preventing the addictive potential. Baumeister [2] also reported that a failure of self-control may be an important cause of addictive behavior. In their study of alcoholic patients, Trimmel and Kopke argued that cognitive concepts such as plans and self-control are associated with the highest scores for moderate drinkers and significantly lower scores in heavy drinkers [27]. All these results imply that impaired self-control may be centrally conducive to addiction in general, including online game addiction.

In this study, a stepwise multiple regression analysis revealed that the severity of online game addiction could be predicted based on narcissistic personality traits, aggression, self-control, interpersonal relationship and occupation, and occupation status (Table 4). However, only 20% of the variance in behavioral consequences was explained with the model. Therefore, further research is needed to identify other factors that contribute to online game addiction.

In general, the online game, especially MMORPG has more strong competitive and fairly aggressive aspects than other Internet activities such as e-mail, ICQ (instant messaging computer program), chatting, or information searching [16]. Wan and Chiou reported that individuals with online game addiction showed strong interest in role-playing of online games, in which they often do things that they dare not to do in real life [30]. And Ko et al. [16] reported that online gaming provides a feeling of control, synchronous interaction with others, and the freedom of self-representation for adolescent. Some other studies reported that Internet addiction seems to be associated with impulsivity [6], neuroticism, psychoticism, and lie subscale of Eysenck personality questionnaire [5], substance

Table 4
Stepwise multiple regression analysis to determine the amount of variance in online game addiction

	B	Standard error	β	t	p-Value
Narcissistic traits	0.258	0.041	0.188	6.314	<0.001
Aggression	0.126	0.024	0.157	5.214	<0.001
Self-control	−0.186	0.038	−0.136	−4.863	<0.001
Interpersonal relationship	−0.878	0.207	−0.102	−4.249	<0.001
Job					
None (reference)					
Worker	−5.734	1.191	−0.179	−4.814	<0.001
Student	−3.632	1.060	−0.128	−3.427	0.001

use experience, high novelty seeking, high harm avoidance, and low reward dependence [15]. However, almost all of these studies did not separate online game addiction from Internet addiction in general. Therefore, it would be difficult to distinguish the characteristics of those individuals with online game addiction from those with Internet addiction. To date, there has been few report directly compared online game addiction to Internet addiction. Chak and Leung [7] analysed the influences of Internet addiction, shyness, locus of control, Internet use, online experience, and demographics on three online activities such as e-mail, ICQ, and chat room, WWW information search, and online games. They reported that heavy online game players are less educated young males who use Internet regularly with many online aliases and they expect high self-control over their own life. Meanwhile, e-mail, ICQ, newspaper, and chat room are favorite activities for female Internet addicts who have many aliases. And information search on Internet is a favorite Internet activity for relatively highly educated young females who are not withdrawn and reserved. Therefore, it is needed to replicate our study in other forms of Internet addiction and compare with results of this study.

The result of this study revealed several important findings to deepen our understanding of the online game addiction process, but several limitations should be considered. First, there are no formalized criteria established for online game addiction yet. Although, Young's questionnaire for Internet addiction used in this study, adapts DSM criteria for substance dependence, more work is needed to see if these criteria hold true for online game addiction. Second, this study has inherent biases present in its methodology by utilizing an expedient group of self-selected online game players. In other words, the subjects who responded may have been more motivated to respond than those who did not experience any problems related to excessive Internet game use or those who were not interested in winning a prize. Therefore, the generalization of our results must be interpreted with caution. Third, we used a self-reported questionnaire method rather than face-to-face in-depth interview. This might compromise the objectivity of the responses. In addition, the online game addiction scale and the narcissistic personality disorder scale used in this study do not have validation data published in peer-reviewed journals yet. However, the online game addiction scale is a slight modification of Young's Internet addiction test, which is validated through many studies on the subject of Internet addiction. And the narcissistic personality disorder scale was significantly correlated with the narcissistic personality inventory by Ruskin and Hall, which is a scale used in the evaluation of narcissistic traits worldwide ($r = 0.49$, $p < 0.01$). Also, we did not use standardized instruments to measure interpersonal relationships. The current investigators were forced to create three items to query interpersonal relationships, but these items were consequently not validated. Fourth, it is important to note that the cross-sectional field study described in this paper did not address causality. Fifth, in online response-based studies such as this there exists an issue of the validity and reliability of the online data [34,35]. When gathering online data from online players, the researcher cannot always be sure that people are who they say they are and that they only take part in the survey once or that they are answering truthfully. However, this is also the case for any other kind of remotely administered study (e.g. postal or telephone), and the validity issues are in many ways not different than those encountered in more conventional research techniques. In this study, we excluded any second questionnaires filled out by the same IP address. In this way, the risk of people taking part in the study more than once was minimized [35].

Despite several limitations, an interesting profile has emerged from the results of this study, suggesting that certain psychological characteristics are associated with online game addiction score. Future research needs to address the implications of the growing number of online game addicts among the population, how the related psychological traits change over time, especially with or without interventions. Many researchers have suggested limiting access to the Internet, especially in vulnerable populations with risk factors for addiction, or monitoring the activities they carry out as preventive methods [12]. Other researchers have developed treatment strategies for pathological online game addiction which focus on helping the addicts to develop effective coping strategies to modify the addictive behavior. For both approaches, the understanding of the ''at-risk population for the addiction'' is imperative. Researchers must make an effort to uncover the risk factors of online game addiction including psychological characteristics. Policy makers should consider these factors, and appropriate psychoeducation should be developed to provide people with the guidance to prevent pathological online gaming. The results of this study will help provide the basic information that can contribute to the development of a prevention program of online game addiction for people.

Appendix 1. Online game addiction scale

The next 20 questions survey the severity of your online game use.

Please read each question, and circle the number on the scale for each question that gives the best answer for you.

To assess your level of addiction, answer the following questions using this scale.

1: rarely 2: occasionally 3: frequently 4: often 5: always

1. I stay online longer than I originally intended.
2. I spend less time with my family to spend more time playing online games.
3. I feel more connected to my online game friends than real world friends.
4. I make new relationships with fellow-online users.

5. Others in my life complain to me about the amount of time I spend on online game.
6. My school work or occupational functions suffer because of the amount of time I spend playing online games.
7. I engage in online game before something else that I need to do.
8. My job performance or productivity suffers because of playing online games.
9. I have lied to others to conceal the real amount time I spend playing online games.
10. I forget disturbing thought about my life and get relief from online game.
11. I find myself anticipating when I will play online game again when I cannot play online game.
12. I fear that life without online game would be boring, empty, and joyless.
13. I have acted annoyed if someone bothers me while I am doing online game.
14. I lose sleep due to late-night online games.
15. I feel preoccupied with online game when off-line, or feel as if I am playing online game even when I am not.
16. I find myself saying 'just a few minutes' when playing online game.
17. I attempt to cut down the amount of time I spend playing online games and fail.
18. I try to hide how long I have been playing online games.
19. I choose to spend more time playing online game over going out with others.
20. I feel depressed, moody, or nervous when I am off-line, but these feelings goes away once I am back online.

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