

Online Gaming Addiction? Motives Predict Addictive Play Behavior in Massively Multiplayer Online Role-Playing Games

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Abstract

Recently, there have been growing concerns about excessive online gaming. Playing Massively Multiplayer Online Role-Playing Games (MMORPGs) appears to be particularly problematic, because these games require a high degree of commitment and time investment from the players to the detriment of occupational, social, and other recreational activities and relations. A number of gaming motives have been linked to excessive online gaming in adolescents and young adults. We assessed 175 current MMORPG players and 90 nonplayers using a Web-based questionnaire regarding their gaming behavior, problems as consequences of gaming, and game motivations and tested their statistical associations. Results indicated that (a) MMORPG players are significantly more likely to experience gaming-related problems relative to nonplayers, and that (b) the gaming motivations escapism and mechanics significantly predicted excessive gaming and appeared as stronger predictors than time investment in game. The findings support the necessity of using measures that distinguish between different types of online games. In addition, this study proves useful regarding the current discussion on establishing (online) gaming addiction as a diagnosis in future categorizations of psychopathology.

Introduction

MASSIVELY MULTIPLAYER ONLINE Role-Playing Games (MMORPGs) have become increasingly popular with games such as *World of Warcraft* being played by more than 11 million people worldwide.¹ A MMORPG can be defined as a game in which numerous players around the globe inhabit a single virtual realm simultaneously, adopt alternative personas, and interact with one another in multiple ways, and thus these games provide a variety of incentives for play. Preliminary evidence suggests that individuals in different age groups can develop problematic patterns of online gaming behavior, including children,² adolescents,³ and young adults,⁴ indicating that excessive gaming is not only a problem for socially withdrawn adolescent gamers.⁵ It has been argued that some players meet criteria similar to those for substance dependence.⁶⁻⁸ A recent systematic review⁹ indicated that online gaming addiction is indeed associated with a variety of psychophysiological symptoms and psychiatric comorbidities, as well as a number of negative consequences. MMORPGs specifically require a high time investment on behalf of the player,¹⁰ which may be conducive to gaming-related problems.

As high engagement with MMORPGs was found to be associated with gaming-related problems,¹¹ it appears important to investigate the motivations that underlie this behavior. Yee¹² measured player motivations and found that they can be categorized into three main components. First, achievement includes the subcomponent advancement (i.e., in-game rank reputation), mechanics (i.e., using imminent game structure), and competition. Second, social includes socializing, relationship, and teamwork. Third, immersion includes discovery (i.e., exploring the game environment), role-playing (i.e., adopting a different persona), customization (i.e., personalization of character), and escapism (i.e., avoidance of real world by engagement in virtual world).¹² Previous research is inconclusive regarding the gaming motivations associated with potential addiction. In one study, it is suggested that immersion predicts problematic Internet use,¹³ whereas other findings indicate that the motivations achievement, escapism, and socializing predict addictive game play.¹⁴ In light of this, the aims of the present research were to (a) compare MMORPG players and nonplayers regarding their experience of gaming-related problems and (b) to assess the relationships between specific game motivations

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and game problems. It is hypothesized that MMORPG players experience significantly more problems due to gaming than nonplayers. Moreover, it is predicted that the game motivations advancement and socializing and the subcomponents of immersion, namely escapism, role-playing, discovery, and customization, as well as time investment in game predict gaming-related problems, defined as a maladaptive pattern of excessive and uncontrollable gaming resulting in negative consequences for the occupational and social life of the subject. Moreover, the correlations between the gaming motivations and the time-spent gaming, as well as gender differences with respect to gaming motivations and the experience of gaming-related problems, are investigated.

Methods

Recruitment and sample

Participants were recruited through an interactive Website on addiction (www.implicit.eu) that was advertised via Dutch gaming forums. The inclusion criteria used for this study were filling out a minimum of 90 percent of the questions posed by (a) the first two questionnaires in the case of non-MMORPG players, and (2) all three questionnaires in the case of MMORPG players. A total of 375 people filled out the questionnaires, of which 110 had to be excluded due to missing data. The analytical sample included 265 participants, 189 males and 76 females, with an average age of 21 years ($SD=6.5$ years). Of those participants, 70.2 percent were still in school, 27.2 percent were working, and 2.6 percent were unemployed; 90 percent were Dutch, 8.3 percent came from Germany and Belgium, and 2.3 percent were born in a different country. A total of 175 persons filled out the questionnaire related to MMORPG experience and self-identified as MMORPG players. In this group, the average age was comparable to the initial group, whereas the gender distribution differed, because the percentage of female players decreased from 28.7 percent to 13.1 percent.

Assessment

Three questionnaires were used to assess background variables, problematic MMORPG play behavior, and gaming motivation.

Background variables. The first questionnaire assessed demographics, including questions about age, gender, and education. Moreover, it included questions about habitual behaviors as well as alcohol and drug use, and computer game preference, weekly time spent on gaming, and the highest number of hours spent in single gaming session.

MMORPG problems. To assess problems with gaming, the Problem Video Game Playing Questionnaire (PVP)⁶ was translated from English into Dutch by a bilingual speaker, translated back into English by a native speaker, and the consistency of translations was checked by yet another party to ensure the translated questionnaire's representation validity.¹⁵ In the original nine-item questionnaire, the DSM-IV¹⁶ criteria for pathological gambling and substance dependence were used, asking participants to answer whether they had experienced specific problems related to gaming during the

past year. The scale's internal consistency was found to be acceptable for a scale of this size with a Cronbach's alpha of 0.69. The scale was significantly correlated with the frequency and duration of play, as well as with the Severity of Dependence Scale,¹⁷ indicating that its construct validity is adequate, and that it may potentially be used for populations older than the original adolescent sample.⁶

Gaming motivations. The third questionnaire analyzed game motivations and has been validated on a sample of 3,000 MMORPG players,¹² which is the largest specified sample used for this population to the present day. The included 10-game motivation scales assessed advancement, mechanics, competition, socializing, relationship, teamwork, discovery, role-playing, customization, and escapism, and they were found to be internally consistent with Cronbach's alpha values ranging from 0.65 to 0.87. Yee's scale is the only psychometric instrument that (a) assesses MMORPG playing motivations, (b) that has been validated on a large and (c) specific sample developed up to date.

Procedure

Data were collected by means of the Internet because this way, a large response rate was ensured, and participant recruitment as well as data collection were simplified, and costs were kept low.¹⁸ On the Website, participants were informed about the anonymity of their data and asked to provide their informed consent. Moreover, a lottery was announced as an incentive for participation.

Statistical approach

For all analyses, all MMORPG players in the sample ($n=175$) were included. First, game motivations were analyzed using a principal components analysis (PCA) with oblimin rotation (to permit the possibility that factors could be correlated). Obtained scales were compared with those reported by Yee,¹² and their internal consistency was computed using Cronbach's alpha. For the subsequent correlation analyses, Bonferroni corrections for multiple comparisons were applied to control for a possible alpha error as suggested by Curtin and Schulz.¹⁹ After controlling for background variables, the motives were then used in hierarchical regression analyses to predict problematic gaming. The final reported hierarchical regression analysis excluded variables that were not predictive at all ($p>0.30^*$).

Results

The internal consistency of the PVP was found to be adequate (Cronbach's alpha=0.78). The total PVP scores ranged from 0 to 9 with a mean of 3.86 ($SD=2.32$) for MMORPG players ($n=175$), compared to 1.25 in the non-MMORPG group ($n=90$; $SD=1.69$), and the difference between groups was statistically significant [$t(265)=-10.55$, $p<0.01$]. Male and female MMORPG players scored an average of 3.85 ($SD=2.33$) and 3.91 ($SD=2.27$), respectively, compared to 1.98 ($SD=2.06$) and 0.70 ($SD=1.07$) for non-MMORPG

*The decision for this cut-off point is based on Yee's initial analysis of game motivations.¹²

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TABLE 1. CRONBACH'S α AND EIGEN VALUES OF THE NINE-GAME MOTIVATION SCALES AND CORRELATIONS BETWEEN PROBLEM VIDEO GAME-PLAYING SCORES, GAMING HOURS, AND GAME MOTIVATION SCALES

		PVP	Hours
Hours		0.608 ^a	1
Motivations	Cronbach's α		
MECH	0.66	0.494 ^a	0.417 ^a
COMP	0.74	0.386 ^a	0.340 ^a
REL	0.70	0.312 ^a	0.459 ^a
DISC	0.69	0.232 ^a	0.288 ^a
ROLE	0.67	0.257 ^a	0.235 ^a
CUST	0.74	0.358 ^a	0.250 ^a
ESC	0.66	0.563 ^a	0.437 ^a
SOC	0.79	0.215 ^a	0.260 ^a
ADV	0.77	0.419 ^a	0.230 ^a

PVP, total score of problems based on this questionnaire; hours, average weekly gaming hours.

PVP, Problem Video Game Playing; MECH, mechanics; COMP, competition; REL, relationship; DISC, discovery; ROLE, role-playing; CUST, customization; ESC, escapism; SOC, socializing; ADV, advancement.

^aCorrelations are significant at the 0.05 level (two-tailed) after applying Bonferroni corrections for multiple comparisons if >2 comparisons were conducted.

players ($n=90$). Approximately 23 percent had a total score above five,[†] among which 89 percent were males.

In terms of the number of weekly hours spent on gaming (on- and offline), non-MMORPG players played an average of 4.74 hours ($SD=7.79$) and played significantly less than MMORPG players [$M=27.42$, $SD=18.41$; $t(253)=-14.00$, $p<0.01$].

Gaming motivations

Gaming motivations were analyzed using a PCA with an oblique rotation on the 40 items from the game motivation questionnaires, resulting in the extraction of 10 factors with Eigenvalues greater than one. Together, those factors accounted for 66.5 percent of the variance in scores. Nine of these ten factors appeared to have adequate internal consistency with Cronbach's alpha values larger than 0.65. The factor teamwork had an inadequate internal consistency and was excluded from further analysis. Unweighted averages for every participant were used to calculate the scale scores to investigate their associations with the research variables as well as the background variables gender and weekly gaming hours. All game motivation scales apart from discovery and socialization were found to be significantly correlated with the dependent variable. Moreover, a significant association between PVP scores and weekly gaming hours was found. In addition, weekly gaming hours significantly correlated with

[†]The PVP is based on officially established diagnoses for pathological gambling and substance dependence. To be diagnosed with pathological gambling, 5/10 DSM-IV TR criteria need to be fulfilled, and in the case of substance dependence, a minimum of 3/7 criteria must be endorsed. Using a conservative approach, affirming the presence of a minimum of 5/10 criteria on the PVP, it can be assumed that the respective player's gaming behavior is problematic and potentially pathological.

relationship, advancement, escapism, mechanics, and competition. The correlations are presented in Table 1.

On the basis of the computed scale scores, a scale of main components was calculated, leaving out the teamwork scale. Advancement, socialization, and role-playing emerged as game motivations with Cronbach's alpha values greater than 0.6. The correlations between the game motivation scales are presented in Table 2.

To investigate which game motivations and background variables contribute to the prediction of gaming problems, a hierarchical multiple regression analysis with PVP scores as the dependent variable was performed. The background variables were entered in block one, and the nine-game motivations and main components were entered in block two. On the basis of these results, another hierarchical multiple regression analysis was performed taking into consideration only the relevant predictors, that is, those based on p -values smaller than 0.3, as presented in Table 3.

The background variables gender and weekly time-spent gaming explained 39 percent of the variance [$F(2)=83.67$, $p<0.001$]. Furthermore, 23 percent of the variance were explained by the game motivations [F -change (7)=16.45, $p<0.001$]. From the predictors, only escapism ($\beta=0.36$, $p<0.001$), mechanics ($\beta=0.21$, $p<0.05$), and weekly gaming hours ($\beta=0.17$, $p<0.05$) were significant. Thus, the hypothesis that problematic gaming is associated with the game motivation escapism was supported. Moreover, adding the game motivations into the model in step 2 lessened the effect of gender in the first step of the analysis ($\beta=-0.15$, $p<0.005$) to become nonsignificant in predicting problematic gaming when the gaming motivations were added.

Discussion

The purpose of this study was to compare MMORPG gamers and non-MMORPG players regarding their experience of gaming-related problems and to assess the associations between gaming motivations, time investment, and gaming-related problems. This research supports the hypothesis that MMORPG players were significantly more likely to experience gaming-related problems than players who do not engage in playing MMORPGs. It may partially be explained by MMORPG-imminent characteristics, such as the endlessness of these types of games, as well as variable reinforcement schedules²⁰ that encourage continued game play similar to gambling.²¹ Moreover, playing MMORPGs has been linked to addiction,¹¹ as well as physiological consequences, such as seizures.²² Taken together, it appears that excessive playing of MMORPGs may put a player at risk to develop gaming-related problems.

In addition to this, it appears that the gaming motivations escapism and mechanics were found to be significantly associated with gaming-related problems, offering partial support to the findings of both Caplan et al.¹³ and Zanetta Dauriat et al.¹⁴ Escapism (as a subcomponent of immersion) and mechanics (as a subcomponent of achievement) were found to be significant predictors of gaming-related problems. However, only a single subcomponent for each main motivation cluster appeared to be significant rather than all subcomponents, which provides further details on Caplan et al.'s findings.¹³ Therefore, players who play MMORPGs to escape from reality experienced more problems as a consequence of gaming, which is supported by

TABLE 2. CORRELATIONS BETWEEN THE GAME MOTIVATION SCALES

	SOC	REL	ADV	COMP	MECH	DISC	ROLE	CUST	ESC
SOC	1								
REL	0.547 ^a	1							
ADV	0.227	0.077	1						
COMP	0.378 ^a	0.279 ^a	0.476 ^a	1					
MECH	0.345 ^a	0.311 ^a	0.577 ^a	0.370 ^a	1				
DISC	0.529 ^a	0.296 ^a	0.321 ^a	0.263 ^a	0.338 ^a	1			
ROLE	0.299 ^a	0.286 ^a	0.313 ^a	0.319 ^a	0.269 ^a	0.497 ^a	1		
CUST	0.320 ^a	0.220	0.465 ^a	0.301 ^a	0.435 ^a	0.535 ^a	0.439 ^a	1	
ESC	0.318 ^a	0.325 ^a	0.440 ^a	0.472 ^a	0.424 ^a	0.449 ^a	0.565 ^a	0.519 ^a	1

^aCorrelations are significant at the 0.05 level (two-tailed) after applying Bonferroni corrections for multiple comparisons.

research.²³ Escapism is a good predictor of problematic gaming, and this suggests that it plays an important role in the maintenance of problematic behaviors. Mechanics on the other hand is a game motivation that is based on the structural characteristics of the game (i.e., the game's setup). Players who want to improve their performance in the game need to get to know the game and the best strategies to play it which requires a high level of time investment and energy on their behalf. Thus, mechanics was found to predict problematic gaming in the current study. Moreover, the association between problematic gaming and weekly gaming hours is also supported by Yee.¹² It appears that the longer people play, the more likely they are to experience occupational and social problems because of the large time investment in the game.²³ Nevertheless, after including game motivations in the model, it appeared that the effect of weekly gaming hours on problematic gaming was reduced. Therefore, gaming motivations are stronger predictors of problematic gaming than time investment, which is in line with other researchers' findings, indicating that time investment is but one small factor in pathological video gaming.²⁴

It should be noted that in this study, gaming-related problems were found to be associated with motives to compete and master the mechanics of the online game, which is quite different from what is observed in recognized (i.e.,

substance-related) addictive disorders, and frames the issue of excessive gaming as a trade-off: one loses in other areas of life, but gains in areas of mechanics and competition. No such trade-off is observed in the other addictive behaviors. Therefore, it raises important questions about (a) the extent to which the problems that are observed are rightly treated as psychopathology, and (b) what this actually means for the classification of a behavioral addiction such as online gaming addiction. It appears that there is a thin line between high engagement (that may be indicated by the mechanics and competition motivations) and addiction, a finding that has already been suggested by previous studies,^{25,26} where excessive time investment can lead to problematic gaming (especially once the escapism motive starts to play a role) or can naturally lead to reduced time investment.²⁷ A lack of capacity and/or motivation to inhibit excessive behavior could be a characteristic shared between behavioral addictions and substance dependence.²⁸⁻³⁰ Accordingly, future research can be informed by more specifically addressing this distinction, possibly by using qualitative techniques that enable the collection of detailed data on players' motivations and addiction experiences, and their trajectories to behavioral addiction or return to less problematic levels of gaming.

The following limitations of the study as well as suggestions for future research should be noted. First, a convenience sample was used that consisted of online respondents, which might limit the overall generalizability of the findings to other populations. Second, future research may be helped by including prospective methods to understand causality between gaming motivations and gaming problems as well as potential gaming addiction.

Third, although Salguero and Moran's PVP Scale⁶ was found to be valid, and to have adequate internal consistency, it does not (a) discriminate computer from console games, (b) distinguish between online and offline games, and (c) specify the respective (online) game genres. Recent research suggests that the assessment of potential online gaming addiction must be specific, and it requires the utilization of validated and reliable psychometric instruments.⁹ This study's finding that MMORPG players are more likely to experience gaming-related problems relative to non-MMORPG players furthermore emphasizes the necessity to distinguish between playing different types of games. This has important implications for future research, particularly regarding the choice of measurement instruments used to assess problematic online gaming.

In addition to this, the PVP scale was initially devised to be used on adolescent populations aged between 13 and 18

TABLE 3. MULTIPLE REGRESSION ON PROBLEM VIDEO GAME PLAYING-SCORES

	B	SE B	β
Step 1			
Constant	2.59	0.43	
Gender	-0.82	0.28	-0.15*
Gaming hours/week	0.07	0.01	0.56*
Step 2			
Constant	-2.52	1.02	
Gender	0.67	0.46	0.10
Gaming hours/week	0.02	0.01	0.17**
Mechanics	0.55	0.22	0.21**
Relationship	0.30	0.22	0.11
Escapism	0.96	0.23	0.36*
Advancement	0.25	0.20	0.11
Competition	0.31	0.22	0.12
Socializing	-0.29	0.22	-0.10
Roleplaying	-0.31	0.21	-0.11

$R^2=0.39$ for Step 1; $R^2=0.46$ ($p's < 0.001$).

* $p < 0.01$; ** $p < 0.05$.

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years.⁶ In their original analysis, the authors cross-validated the construct validity of their scale by correlating their participants' PVP scores with scores on the Severity of Dependence Scale¹⁷ that has been validated on an adult population. On this basis, in the present study, it was assumed that the PVP is valid and applicable for a population that is older than the original adolescent sample. Therefore, future research needs to address these problems in measurement and specificity. Furthermore, it needs to be noted that the present sample was relatively small, and therefore generalization to other populations may be difficult. Nevertheless, because it was very specific in that it included MMORPG players, the results may tentatively be generalized to players of these games.

To conclude, understanding the motivations associated with the development of addictive behaviors related to playing online games (MMORPGs in particular) will promote future research and will pave the way for addiction prevention and treatment approaches. Discerning motivations for addictive game behaviors serves the purpose of informing clinical practice and research in the new field of problematic online gaming. The reasons for playing online games serve as a first step to understand how initial high engagement can develop into a potential behavioral addiction. Moreover, understanding that specific gaming motivations such as escapism and mechanics appear to be more strongly associated with gaming-related problems relative to other motivations, and the time-spent gaming will particularly benefit the psychoeducational aspect of therapy both for the patient as well as for their significant others. Accordingly, it is not time investment that is problematic per se, but motivations appear as factors significant in predicting problems. Once more empirical knowledge is gathered about the motivations and symptoms that distinguish leisure time, excessive, and potentially addicted players from one another specific prevention efforts and treatment approaches can be developed. In terms of prevention, young persons who play for particular reasons could be identified as a population at risk, and therefore be targeted specifically. With regards to treatment, cognitive behavioral therapy protocols will benefit from the established knowledge to specifically target modifications in behaviors and cognitions related to the motivations identified.

Disclosure Statement

No competing financial interests exist.

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