



Emotional stability of players in massively multiplayer online games

Player styles and player characteristics

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Certification of authorship

I hereby certify that I am the sole author of this report. All assistance I have received from outside sources have been documented in the report, as well as, listed after the conclusion under “references.” This report was created exclusively by me specifically for the Master degree Communication and Information Sciences at Tilburg University.

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Preface

Abstract

The present study investigates the relationship between emotional stability defined in the Big_Five model and tendency towards displaying fantasy, escapism and socializing in MMORPGs. The literature suggests that there is a link between an online game player`s personality and his/hers actions in a game. This study examines whether and how emotional stability is expressed in virtual worlds. It also investigates whether age plays a role in the emotional stability of game players. With collaboration of The Playful Systems group at MIT MEDIA LAB, personality traits and game types of a large group of online-game players were assessed by extensive online survey. No link was found between emotional stability and socializing (in game interaction). However, emotional stability emerged as an important predictor of tendencies towards seeking fantasy and escapism in a game. [Results suggest that some personality traits are expressed in form of game type, namely agreeableness and extraversion predicting socializing \(in game interaction\).](#)

Keywords: Online game, Player, International Personality Item Pool (IPIP), Emotional stability, In-game relationships, Escapism, Fantasy, In-game socializing,

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Introduction

The evolution of online games parallels with the evolution of computers and computer networking (Adams & Rollings, 2006). Although the history of online gaming can be dated back to 1970s with the development of packet-based computer networking technology, in the early 1990s the number of online game players skyrocketed (Woolley, 1994). It was the increased availability of internet that forever changed the gaming industry.

Massive multiplayer online role-playing games (MMORPGs) are a recent phenomenon. For the first time, this term was used by Richard Garriott to describe the launch of Ultima Online in 1997, one of the most popular multiplayer games (Indvik, 2012). In MMORPGs game players take on a character of a certain fantasy role for a long period of time and they socialize within this virtual world and participate in quests and battles (Xu, Cao, Sellen, Herbrich, & Graepel, 2011). Elizabeth Kolbert (2001) has described MMOGs as graphical 2- or 3-D online videogames that are being played through self-created “avatars” to interact with other players within a game. These virtual worlds allow users to immerse into a fantasy setting full of wizards and knights and fight the battles or build social relationships. It is these characteristics that contributed to growing popularity of these games among all age groups and becoming the major form of entertainment (Steinkuehler, 2004).

It is no surprise that these games offer a fruitful pool of behavioral, cultural, ethnological and personality cues that are waiting to be explored. The unique possibilities of virtual worlds offer a great platform for researching the connections between personality and behavior in the game environment. Personality expression is often different in physical world than behavior that users often display in virtual world, and the nature of these game`s environment often encourage this (Yee, Ducheneaut, Nelson, & Likarish, 2011). An earlier study proved this by recording

video-taped face-to-face conversations, where extroverted individuals spoke louder, more energetic and used more gestures than during physical interactions (Funder & Sneed, 1993). Being able to infer a user's personality from their game play offers intriguing possibilities for research, knowledge discovery, and applicability. Knowledge of individual's personality can have numerous applications in designing systems more responsive to user's needs whether it concerns further development of MMOGs, online marketing or e-commerce (Yee, Ducheneaut, Nelson, & Likarish, 2011). This study attempts to explore the extent to which player's emotional stability is related to his or her gamer type using data from popular MMOGs, World of Warcraft, League of Legends, Battlefield: Hardline and Battlefield 4¹.

The outline of this thesis is as follows: The theoretical background chapter provides a synopsis of relevant literature and reasoning to establish the research questions for the study. The method chapter explains research design, instruments, respondents and statistical analysis. The results chapter provides detailed results of the statistical analysis as a basis for answering the research questions. The conclusion chapter summarizes the outcome of the research, after which limitations of this research will be described.

¹ World of Warcraft (WoW), is one of the most successful online games to date with more than 10 million players, and focuses on fantasy and questing in a medieval fantasy world. (Kolbert, 2001). League of Legends is a fast competitive game based on two teams of champions, where each individual controls a different fantasy character with various tasks in head-to-head battles across multiple battlefields (Riot, 2015). Battlefield 4 and Hardline are based on military warfare and fighting crime respectively, featuring intense and dramatic fighting in dynamic environments (battlefield.com, 2016).

Theoretical Background

With the widespread availability of the internet, cyberspace changes the way individuals search to create and maintain interpersonal relationships with the people they have never met face to face (Peris, et al., 2002). As a platform for creating and maintaining personal relationships, often online games are used. Although research into online gaming has increased in the early 2000s, relatively little has been explored about relationship between emotional stability and types of in-game behavior. In contrast, social relationships, how players form intimate relationships within a game have been studied extensively (Pace, Bardzell, & Bardzell, 2010).

Many online game players spend a great amount of time in their favorite virtual worlds. A large percentage of these players are teenagers who show behaviors normally associated with physical addiction (Lo, Wang, & Fang, 2005). Players of massively multiplayer online games such as League of Legends (LOL) or World of Warcraft (WOW) have been labeled as being more susceptible to playing games often with more than 20 hr/week spent on gaming (D. NG & Peter, 2005). Peever, Johnson, & Gardner (2004) have conducted research on certain personality types and their exhibited preferences for particular game genres, revealing possible matches between personality traits and these genres. The relationship between personality traits and gaming behavior has also been researched by Mehroof & Griffiths (2010), examining a number of personality traits (sensation seeking, self-control, aggression, etc.). The results of this study suggest that personality traits play a role in development of online gaming addiction. Thus, these studies suggest that personality traits have an influence on developing negative gaming behavior (addiction) or choice of a particular online game. In terms of social anxiety, Mehroof & Griffiths

(2010), stress that some online game players lack self-confidence and that playing games allows them to feel more comfortable by taking on a role within a fantasy world.

There seems to be an apparent link between an online game player's personality and his/her actions in a game. Therefore the present research investigates this link from the perspective of immersion in fantasy worlds and social relationships. For the purpose of this study I will focus on gamer type, as defined by Project GAMR (discussed in the next chapter), concentrating on the elements fantasy, escapism, socializing and relationships. *Fantasy* refers to player's desire for alter-ego creation, and performing actions that one would not normally perform in real life. *Escapism* represents player's motivation within a game that allows him to escape real life. *Socializing* represents player's interest in getting to know/chatting with other players. *Relationship* in Gamer type is a player's willingness to create and maintain meaningful relationships with other players.

Research by Correa, Hinsley and Zinuga (2010) found a negative correlation between emotional stability and social media use. People with lower emotional stability were more likely to engage in these social activities. Furthermore, creation and maintaining of social relationships is to a large degree determined by emotional development of an individual (Keltner & Kring, 1998). In examining personality as a predictor of use of social media, a positive relationship between age and emotional stability was found (Correa, Hinsley, & Homero, 2010). Based on the previous literature, the present study has examined one of the Personality (IPIP) traits, namely emotional stability, and the relationship between emotional stability and online game player's (lack of) social contacts and meaningful relationships.

Therefore, the present study investigates the following problem statement and research question:

Problem Statement: To what extent is a player's emotional stability related to his or her gamer type?

The problem statement immediately leads to the first research question:

RQ1: What is the relationship between emotional stability and having satisfactory in-game relationships?

The individuals that score low on emotional stability tend to be sensitive and vulnerable (Yee, Ducheneaut, Nelson, & Likarish, 2011). Games with a role-playing fantasy component can have beneficial effect on these individuals (Allison, von Wahlde, Shockley, & O.Gabbard, 2006) and many online games allow and encourage players to become emerged in the virtual world and behave inconsistently to their behavior in the real world (Yee, Ducheneaut, Nelson, & Likarish, 2011). The ability to immerse in a fantasy world allows users to "try on" new identities and reduce social anxiety and loneliness (Allison, von Wahlde, Shockley, & O.Gabbard, 2006). Based on the previous research, the present study assumes that individuals that seek and indulge in fantasy and escapism in online games would be more susceptible to suffer from emotional instability. This leads to the second research question:

RQ2: What is the relationship between emotional stability and tendency towards displaying fantasy and escapism within a massive online role-player game?

Yee, et al. (2011) discovered that many behavioral cues in War of Warcraft were related to personality and that these behavioral indicators can be used to predict a gamer's personality.

Based on these results I expected that an individual's type of game play can be determined from his personality. This leads to the third research question:

RQ3: To what extent can gamer type of an online game player be determined from his personality?

Method

Data collection

The relationship between online game player emotional stability and different forms of gamer type (namely in-game relationships and tendency towards displaying fantasy and escapism) were tested using quantitative data. The design of this study is cross-sectional and all data was gathered at on one single moment in time. Data was collected using an online survey and conducted among adult online game players. The questionnaire was created in collaboration with The Playful Systems group at MIT MEDIA LAB. The contact person in this collaboration was Shoshannah Tekofsky, MSc, who worked at MIT MEDIA LAB at the time of development of the survey. The questionnaire, 'Project GAMR' went live on 21st October 2015 at <http://projectgamr.com/> and the data was retrieved on 12th November 2015. The respondents eligible to participate in this research were those who had experience playing either one or multiple of the following games on personal computer: League of Legends, Battlefield: Hardline, Battlefield 4 and World of Warcraft.

Prior to answering the questionnaire, participants were informed that all data would be kept anonymous and private and that participant's player name would be used by the game company (Riot Games, Electronic Arts Inc.) to extract game behavior data associated with that player's name for each relevant game. The minor respondents were not eligible to participate in the research, although they were allowed to fill out the tests. All data concerning minors was excluded from data analysis. Respondents were informed that individual players' names would be deleted after the end of study to ensure absolute anonymity (Tekofsky, et al., 2015). To ensure that participants understand their involvement in the research and a voluntary nature of their participation, they were requested to sign consent.

Respondents

The questionnaire was shared on the official website of the project, Project Gamr, and corresponding Facebook and Twitter account. The final number of respondents was 2024 at the time of data retrieval (12th November 2015) of which 85.6% ($N = 1732$) were male and 13.6% ($N = 275$) were female, and some respondents did not answer. Upon excluding the minors, the respondents were between the ages of 18 and 65 ($M = 25.72$, $SD = 7.27$). The only significant outliers were found in the socializing variable where the outlier responses ranged from 0 to 2, while the most responses ranged between 3 and 12. The outlier responses are realistic, if the respondents answered very low on each of the 3 socializing variables with the range of possible responses (“0”-Very inaccurate; “4”-Very Accurate). In the data analysis, a decision was made not to remove any outliers, because they followed a realistic pattern of answering the questionnaire. The final number of respondents that were used for data analysis was 2024 after excluding the minors.

Instruments

The “gamer type” used in this study was defined by Shoshannah Tekofsky, MSc, and consists of 13 elements. Values for these elements range from 0 to 12, and were determined using three questions each. The model for gamer type was based on literature. In this study I used 4 elements of gamer type, fantasy, escapism, socializing and relationships within a game. This data was acquired from the Project Gamr dataset, consisting of answers of 2024 respondents. Each of the independent gamer type variables (see Appendix 1) were measured on the three 5-point Likert-scales (“0”-Very inaccurate; “4”-Very Accurate). Reliability analyses were conducted on each of the gamer type variables. Cronbach’s α were, .708, .875, .756 and .807 respectively for variables fantasy, escapism, socializing and relationship. Descriptive

statistics of these variables will be explored in the result section. As a method for data analysis, SPSS statistical software was used.

Due to meaning similarity and possible participant confusion between socializing and relationship type questions, a principal component analysis (PCA) was conducted on these scales. The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis, $KMO=.813$ for the relationship and socializing scales. Bartlett's test of sphericity tests the hypothesis that the correlation matrix is an identity matrix (Introduction to SAS.); the sig. value leads to conclusion that there are correlations in the data set that are appropriate for factor analysis, $\chi^2(15) = 5032.156$, $p < .001$. These results show overlap in scales of these two variables (<http://www.utexas.edu/>, 2010). Based on the PCA, this model accounts for 55.8% of the explained variance. The variables socializing and relationship were therefore merged into variable 'In Game Interaction', which will be used in further data analysis.

Emotional stability was set as the dependent variable, being part of the personality (IPIP) dimensions of the Project Gamer dataset. Emotional stability (see Appendix 2) was measured on the ten 5-point Likert-scales ("0"-Very inaccurate; "4"-Very Accurate). The constants composing emotional stability were derived from the official Personality (IPIP) measure, which has been composed from 50-item IPIP version of the Big_Five Markers (Goldberg, 1992). Reliability analyses were conducted on each individual emotional stability component. Overall Cronbach's α was .647. The measure of reliability could be increased, if question nr. 9 was deleted, resulting in Cronbach's α .748. Based on the establishment and international recognition of International Personality Item Pool (IPIP) as a public domain collection of personality test items, a decision was made to keep question nr. 9 in the analysis.

Statistical Analytics

The nature of the research questions (RQ1, 2, 3) suggests that data analysis had to be done using bivariate and partial correlations and multiple linear regressions. The Kolmogorov–Smirnov nonparametric normality test showed that the independent variables were not normally distributed. The histograms showed significant skewness and kurtosis. Dependent variable emotional stability was normally distributed. As a result of violation of assumptions of normal distribution, a non-parametric Spearman's Rank Correlation Coefficient was used to discover the strength of a link between two sets of data. RQ3 involves dependent variables (IPIP) predicting independent variables (gamer type). Based on the underlying assumptions, multiple linear regressions were selected to predict this relationship. The results of correlations and regression analysis together with variable descriptives are given in the following chapter.

Results

Descriptives

This chapter deals with statistics that are found in the variables used in this research. For each of these variables sample size, range, mean and standard deviation are shown in table 1. As presented in table 1, the respondents on average scored 8.17 ($SD=3.028$) in a range of 0-12 for seeking fantasy variable. For escapism, the respondents scored lower ($M=7.08$, $SD=3.729$) in the same range. The average age of the respondents was 25.7 years ($SD=7.27$) on the age range of 18 to 65.

Table 1.
Descriptive statistics of all dependent and independent variables

	N	Range	Minimum	Maximum	Sum	Mean	Std. Deviation
Fantasy	2024	12.00	.00	12.00	16539.00	8.1714	3.02841
Escapism	2024	12.00	.00	12.00	14339.00	7.0845	3.72979
Immersion	2024	33.00	3.00	36.00	40548.00	20.0336	6.14810
In_Game_Interaction	2024	24.00	.00	24.00	29347.00	14.4995	5.56630
Emotional stability	2024	36.00	.00	36.00	31900.00	15.7609	6.29448
Age	2024	47.00	18.00	65.00	52053.00	25.7179	7.27172

Fantasy and escapism are related to certain gamer needs. According to Yee (2006), immersion is the term to describe these needs. Immersion includes exploration, role-play, escapism and fantasy. Satisfaction of these needs is one of the reasons for online game play (Yee N. , 2006). Similarly, Witmer and Singer (1998) describe immersion by perceiving oneself to be included in and interacting with an environment that contains stimuli and experience. McMahan (2003) refers to immersion as being “caught up in the game`s story world”. Based on these theories a new variable describing these constants, called “immersion”, was created. This

variable is composed of fantasy, escapism and story (one of the 13 gamer type elements) with Cronbach's α .694.

The independent variable scores are higher for immersion ($M=20.03$, $SD=6.14$) than for in game interaction ($M=14.49$, $SD=5.56$). These score differences suggest that the respondents are more interested in becoming part of a fantasy story or fantasy world than in creating and maintaining meaningful relationships with other players.

Correlations

The first research question concerns relationship between emotional stability and in game interaction. “What is the relationship between emotional stability and having satisfactory in game relationship?” Table 2 shows the correlations between the measured variables. According to the results, there is no correlation between satisfactory in game interaction and emotional stability ($r=.005$), thus the emotional stability of an individual does not have an impact on one's interest in creating and maintaining relationships within a game.

Table 2.

Pearson's correlations between measured variables

	Fantasy	Escapism	Immersion	IGI	ES	Age
Fantasy	1	.540*	.794*	.197*	.151*	-.094*
Escapism		1	.887*	.136*	.323*	-.053
Immersion			1	.185*	.297*	-.070*
In_Game_Interaction				1	.005	-.108*
Emotional stability					1	-.047
Age						1

$n = 2024$

*.Correlation is significant at the 0.01 level (2-tailed).

The second research question “What is the relationship between emotional stability and tendency towards displaying fantasy and escapism within a massive online role-player game?” was analyzed with three individual correlations. This analysis shows that increased emotional

stability of an individual leads to greater tendency towards seeking fantasy and escapism within a massive online role-player game. We observe this in three of the correlations found: First, the results show that there is a small significant and positive correlation ($r = .151$) between a game player's emotional stability and his interest in fantasy aspects of the game. It seems that as an individual becomes more emotionally stable, his interest in fantasy in a game increases. Secondly, a similar correlation could be found between emotional stability and escapism. There has been found strong positive and significant relationship between these variables ($r = .329$). These results show that more emotionally stable respondents were more eager in escapism representations in a game. Finally, immersion, a representation of fantasy, escapism and story variable followed a similar trend. There has been found a positive correlation between immersion and emotional stability ($r = .397$).

Finally, a player's interest in immersion and in game relationships tends to decrease with age $r = -.070$, $r = -.108$ respectively, with a significant effect. No significant effect between emotional stability and age ($r = -.047$) was found. Assuming that age has an influence on the strength of a relationship between variables (Tekofsky, Spronck, Plaat, van den Herik, & Broersen, 2013), the data were re-analyzed controlling for participant's age. The results of partial correlations are displayed in Table 3 below.

Table 3.

Partial correlation with control for Age

		Fantasy	Escapism	Immersion	IGI	ES
Age	Fantasy	1	.535*	.799*	.195*	.159*
	Escapism		1	.879*	.132*	.329*
	Immersion			1	.190*	.301*
	In_Game_Interaction				1	-.001
	Emotional stability					1

 $n = 2024$

*.Correlation is significant at the 0.01 level (2-tailed).

Contrary to previous assumptions age does not seem to carry much effect. It does increase the relationship between emotional stability and fantasy, escapism and immersion. These effects are significant, but they are small.

Regressions

This section discusses the analysis of the third research question “To what extent can gamer type of an online game player be determined from his personality?” Tables 4-7 display multiple linear regression analyses and their b values, standard errors, β and their significance.

The first regression analysis with the dependent variable in game interaction (Table 4) revealed that respondent's personality aspects, extraversion and agreeableness significantly predict one's in game interaction $b = 0.134$, $\beta = .205$, $t(2023) = 9.317$, $p < .001$ and $b = 0.255$, $\beta = .305$, $t(2023) = 14$, $p < .001$ respectively. An individual's personality explains a significant proportion of variance in game interaction, $R^2 = .161$, $F(5, 2018) = 77.5$, $p < .001$.

Table 4.
The coefficient of the regression model (In Game Interaction)

	B	Std. Error	Beta	Sig.
(Constant)	4.180	1.070		.000
Extraversion	.134	.014	.205	.000
Agreeableness	.255	.018	.305	.000
Conscientiousness	-.027	.019	-.030	.152
Emotional_stability	-.037	.015	-.051	.018
Openness	-.014	.022	-.014	.510

Table 5 shows results from regression analysis with dependent variable fantasy. This regression model revealed that none of the personality aspects predict an individual's gamer type (fantasy).

Table 5.

The coefficient of the regression model (Fantasy)

	B	Std. Error	Beta	Sig.
(Constant)	7.812	.621		.000
Extraversion	-.023	.008	-.064	.006
Agreeableness	.043	.010	.094	.000
Conscientiousness	-.010	.011	-.020	.376
Emotional_stability	-.064	.009	-.161	.000
Openness	.047	.013	.086	.000

Similarly, the following regression analysis (Table 6) with dependent variable escapism does show a lack of predictive features. These results reveal that person's personality does not predict their interest in escapism, emotional stability $b = -.159$, $\beta = -.327$, $t(2023) = -15.207$, $p < .001$. A person's personality score does not explain a significant proportion of variance in tendency towards escapism, $R^2 = .146$, $F(5, 2018) = 68.84$, $p < .001$.

Table 6.

The coefficient of the regression model (Escapism)

	B	Std. Error	Beta	Sig.
(Constant)	12.674	.724		.000
Extraversion	-.052	.010	-.120	.000
Agreeableness	.049	.012	.087	.000
Conscientiousness	-.033	.013	-.057	.008
Emotional_stability	-.159	.010	-.327	.000
Openness	.010	.015	.015	.502

Finally, the last regression (dependent variable immersion) shows that person's personality does not predict their interest in immersion, emotional stability $b = -.236$, $\beta = -.294$, $t(2023) = -13.364$, $p < .001$. A person's personality score does not explain a significant proportion of variance in tendency towards immersion, $R^2 = .106$, $F(5, 2018) = 48.023$, $p < .001$.

Table 7.

The coefficient of the regression model (Immersion)

	B	Std. Error	Beta	Sig.
(Constant)	27.536	1.220		.000
Extraversion	-.049	.016	-.068	.003
Agreeableness	.060	.021	.065	.004
Conscientiousness	-.048	.021	-.049	.025
Emotional_stability	-.236	.018	-.294	.000
Openness	.023	.025	.021	.349

To summarize, there is no found relationship between emotional stability of an individual and his or hers satisfactory in game interaction. On the other hand, results showed that greater emotional stability of a respondent has a significant positive impact on his tendency towards seeking fantasy and escapism aspects of an online game. In other words, more emotionally stable players are keener to creating alter-egos and performing unrealistic actions in a game. Similarly, the greater the emotional stability, the greater is player`s willingness to immerse in a game.

Finally, the gamer type of an online game player can be determined from his personality but only in personality aspects of agreeableness and extraversion predicting satisfactory in game interactions. In this case, a player`s agreeableness and extraversion explains his interest in interacting with other online game players.

Conclusion

This study used cross-sectional data obtained from popular MMOGs, World of Warcraft, League of Legends, Battlefield 4 and Battlefield Hardline to examine a player's personality in relation to their gamer type. While MMOGs are games with social aspects, the results show that at least for the games used in this study, contrary to previous studies (Keltner & Kring, 1998) (Correa, Hinsley, & Homero, 2010), creation and maintaining social relationships within a game is not determined by emotional development of an individual. In other words, in game socializing and interaction is not dependent on player's low or high emotional stability. Although the players do play with other people, because of the nature of MMOGs is "multiplayer", it seems that most do not actively interact with other players or keep the interaction to a minimum. The individual's interest in creating and maintaining relationships in game decreases with age.

Expanding on the above, the data also suggest that, while the players might not be interested in social relationships in a game, the individual's emotional stability plays a role in seeking immersion. The online game players that are more emotionally stable show a greater interest in immersing in the game. Similarly, greater emotional stability of a respondent proved to have a significant positive impact on his tendency towards seeking fantasy and escapism aspects of an online game. These results are consistent with previous studies conducted by Yee (Yee N. , 2006), who proved that exploration, role-play, escapism and fantasy need satisfaction are the reason for online game play. Immersion, described as being "caught up in the game's story world" (McMahan, 2003) proved to be age dependent. The player's interest in immersion decreases with age. In contrast, age did not show a sizable impact on relationship between player's emotional stability and fantasy, and escapism.

The last analysis that the present study undertook, concerns prediction of MMOGs player's gamer type from his personality. These results were partly consistent with previous research by (Yee, Ducheneaut, Nelson, & Likarish, 2011) that discovered that many behavioral cues in War of Warcraft were related to personality and that these can be used to predict a gamer's personality. Two of the Big_Five personality traits, namely agreeableness and extraversion, were positively able to predict in game interaction of MMOGs players. The regression analyses did not show any further prediction relationship between any of the Big_Five personality traits and gamer type.

Based on the success of MMOGs among a wide audience, these results suggest alternative design strategies for these games. Creating and maintaining social relationships in a game might not be as important as designing a spectacular fantasy world experience. A careful combination of game design, where social environment is not aimed at building relationships but rather at a feeling of social presence and support, might be a key to even greater success of MMOGs.

Limitations and future research

This thesis advances the literature exploring the relationship between online game player's personality traits and type of game play in MMOGs. In particular, it focuses on emotional stability and how it is correlated to user's interest in seeking fantasy and escapism aspects in game play.

The research contains a few limitations: Firstly the data was based on online participant recruitment through web and social media. Although this study attempted to gain the most accurate representation of MMOG players, it is possible that the individuals willing to participate in the questionnaire possess certain personality characteristics that made them more susceptible to

engage. This should be noted as one limitation of the study, since the possible bias was not explored. Additionally, a substantially large percentage of respondents were males, although the number of females participating was actually exceptionally large for research of this type.

Secondly, this study did not research all dimensions of the Big_Five model and gamer type, only those that seemed to be relevant based on the previous literature. Testing for other personality traits and gamer type variables might bring greater clarification on how personality is related in general to all aspects of game play. Future research should consider more detailed analyses to get a clear picture of personality vs. in game behavior and how these personality characteristics differ from the physical situations.

Finally, although all online games considered in this research belong to MMOGs, they differ in their level of social and fantasy aspects. This paper contributes to understanding the relationship between emotional stability and gamer type for four of these games. It does not evaluate each of these MMOGs independently. Future studies should consider getting a closer look at individual characteristics of each of these games and examine them independently to account for possible game differences. Overall, it is necessary to continue with exploration of personality traits expressed in different types of online games to better understand generalizability of these findings.

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Appendix 1. Motivational Questionnaire

Factor Name	Item
Competition	It is important to me to be the fastest and most skilled person playing the game I like to play to prove to my friends that I am the best I get upset when I lose to my friends
Challenge	I find it very rewarding to get to the next level I feel proud when I master an aspect of a game I enjoy finding new and creative ways to work through video games
Fantasy	Video games allow me to pretend I am someone/somewhere else I like to do something I could not normally do in real life through a video game I enjoy the excitement of assuming an alter ego in a game
Arousal	I play video games because they excite me Video games keep me on the edge of my seat I find that playing video games raises my level of adrenaline
Story	Video game stories are not important to me Stories in video games just get in the way I am excited to find out what happens next in the story
Escapism	Video games allow me to escape from the problems associated with everyday life I play video games because it allows me to escape real life I play video games to keep my mind off my problems
Loss-Aversion	Losing is frustrating and detracts from my experience Winning is fun; losing is not Losing a game always makes me mad - what a waste of time!
Customization	I really like to customize my character's outfit I like to personalize and customize my character I will put considerable time into designing my character's appearance (e.g., clothes, face)
Grinding/Completion	I like taking the time to pick up every single collectible item in the game I will play a game until I get 100% on it, completing everything in the game I rarely complete collections of in-game items
Autonomy/Exploration	I prefer games that allow me to play however I want I like games that do not put a lot of constraints on the player I like games that offer you a lot of options and choices
Socializing	I enjoy getting to know other players I enjoy chatting with other players I enjoy helping other players
Relationships	I talk to my online friends about my personal issues My online friends offer me support when I have a real life problem I find myself having meaningful conversations with other players
Teamwork	I would rather play as part of a team than solo It is important to me that my character does not need support from other players to do

well

It is important to me that my character can support other players well

Appendix 2. Personality (IPIP)

Number	Statement	Dimension
1	Am the life of the party.	Extraversion
2	Feel little concern for others.	Agreeableness
3	Am always prepared.	Conscientiousness
4	Get stressed out easily.	Emotional Stability
5	Have a rich vocabulary.	Openness
6	Don't talk a lot.	Extraversion
7	Am interested in people.	Agreeableness
8	Leave my belongings around.	Conscientiousness
9	Am relaxed most of the time.	Emotional Stability
10	Have difficulty understanding abstract ideas.	Openness
11	Feel comfortable around people.	Extraversion
12	Insult people.	Agreeableness
13	Pay attention to details.	Conscientiousness
14	Worry about things.	Emotional Stability
15	Have a vivid imagination.	Openness
16	Keep in the background.	Extraversion
17	Sympathize with others' feelings.	Agreeableness
18	Make a mess of things.	Conscientiousness
19	Seldom feel blue.	Emotional Stability
20	Am not interested in abstract ideas.	Openness
21	Start conversations.	Extraversion
22	Am not interested in other people's problems.	Agreeableness
23	Get chores done right away.	Conscientiousness
24	Am easily disturbed.	Emotional Stability
25	Have excellent ideas.	Openness
26	Have little to say.	Extraversion
27	Have a soft heart.	Agreeableness
28	Often forget to put things back in their proper place.	Conscientiousness
29	Get upset easily.	Emotional Stability
30	Do not have a good imagination.	Openness
31	Talk to a lot of different people at parties.	Extraversion
32	Am not really interested in others.	Agreeableness

33	Like order.	Conscientiousness
34	Change my mood a lot.	Emotional Stability
35	Am quick to understand things.	Openness
36	Don't like to draw attention to myself.	Extraversion
37	Take time out for others.	Agreeableness
38	Shirk my duties.	Conscientiousness
39	Have frequent mood swings.	Emotional Stability
40	Use difficult words.	Openness
41	Don't mind being the center of attention.	Extraversion
42	Feel others' emotions.	Agreeableness
43	Follow a schedule.	Conscientiousness
44	Get irritated easily.	Emotional Stability
45	Spend time reflecting on things.	Openness
46	Am quiet around strangers.	Extraversion
47	Make people feel at ease.	Agreeableness
48	Am exacting in my work.	Conscientiousness
49	Often feel blue.	Emotional Stability
50	Am full of ideas.	Openness