Research on the Influence Mechanism of Social Elements on the Continuous Use Intention of Mobile Online Game Players

Yinghao Li[1,a], Chao Wang[1,b,*], and Tengteng Wang[1,c]

[1]*Department of Business Management, Zhejiang Gongshang University, Hangzhou, Zhejiang, China*

a. 1157968835@qq.com, b.1697735654@qq.com, c.2938729618@qq.com

**corresponding author*

Keywords: social cooperation, social competition, perceptual control, perceptual involvement, continuous use intention

Abstract: In recent years, the market scale of mobile online games is constantly expanding, but there are shortcomings in the design and quality of mobile online games in the market, resulting in the continuous use of some mobile online games with poor results. Based on the self-determination theory and flow theory, this paper conducts two experiments to simulate the real mobile online game environment to verify the influence mechanism of social elements on the perceived control, perceived participation and continuous use intention of mobile online game players. The research conclusion shows that:(1) social elements have a significant effect on players' continuous use intention; (2) perceptual control and perceptual participation play a mediating role between social elements and continuous use intention.

1. Introduction

With the development of mobile Internet technology and the popularity of smart phones, the practicability and interest of mobile network terminals have been greatly improved. As of June 2019, the number of China's Internet users has reached 854 million, with a penetration rate of 61.2%. Among them, the number of mobile Internet users has reached 847 million. However, most of the domestic mobile online game developers focus on the game development "profit", thus ignoring some more important factors such as the quality of the game, making the players' continuous use intention is not high, hindering the further development of the mobile online game market. Many scholars study the product design, users' psychological needs and behaviors of games from the perspective of social interaction. It has become a trend to analyze the usage behavior of mobile online game players from a social perspective. This study heart flow, on the basis of theory, self-determination theory, through experimental method, social collaboration in the mobile network games, social competition, competition factors, such as combination type, control of mobile network game players awareness, sense of participation and influence mechanism of sustainable use will for empirical analysis.

2. Literature Review

2.1. Social Elements in Mobile Networks

Many scholars have focused on and studied the social elements in the online game environment and proposed that it is an important motivation for players to participate in games (Yee, 2006). There are two main social elements that mobile online gamers experience in games: competition and cooperation. (Ducheneaut & Morre, 2004).

Social collaboration is a major function of mobile online games, in which people can connect with other players for social collaboration (Choi D & Kim J, 2004). Loreto (2010) investigated the main motivations of users to participate in social and casual games on Facebook, and the results showed that obtaining other people's information, interacting with other players and integrating into the group were the main motivations for them to participate in the game. Aki Jarvinen (2009) further proposed in his research that the social nature of games is one of the five key elements of social network game design, and that social nature should be the starting point and primary consideration of game development.

Social competition is the most used design element in games and gamification products. From the perspective of social competition, more challenging games can bring more flow experience to players (Chen, 2010), which is very effective in enhancing players' flow experience by creating competition among players (Sepehr & Head, 2013). Social competition factors in online games will have an impact on the internal state of individuals, such as emotional emotion, physiological arousal and cognition, and then make players change their behavior in the game (Adachi & Willoughby, 2011). In real mobile online games, competition and cooperation are two essential elements in game design(zhang zhendong, 2015).The influence of different types of social collaboration and social competition combinations on players' willingness to continue to use was also considered in the study.

2.2. Sensory Control and Perceptual Participation

Bateson (1985) defined perceptual control as: when an individual feels that he has the ability to change something, he will gain perceptual control (Burger, 1992). Idsoe (2006) pointed out in his research that the higher the degree of satisfaction of perceptual control, the higher the degree of satisfaction. Wang haijun and wang tao (2007) introduced the theory of perceptual control for the first time in the field of customer engagement, and pointed out that the sense of perceptual control plays an intermediary role between customer engagement and customer satisfaction, and the degree of customer engagement can also regulate the relationship between the sense of perceptual control and customer satisfaction.

Sense of engagement is a psychological process that is the antecedent of consumer loyalty (Bowden, 2009). At the same time, some studies believe that consumer loyalty is one of the results of the sense of participation (Brodie et al., 2013). In addition to the social network games and most of the traditional game fun and challenging, it emphasizes the social interaction in a social network game and social contact, and also more emphasis on strengthening the player in the social contact of the competitive between friends (Schuurman D, Moor K D, & Marez L D et al., 2008). As a result, good social network games can get more engagement than traditional games.

2.3. Self-Determination Theory and Flow Theory

Self-determination theory is a cognitive motivational view developed in the background of positive

psychology in the 1980s. It holds that the needs of ability, autonomy and relationships are the basic needs of human beings, and the pursuit of the satisfaction of these three needs is the driving force of human behavior (Deci & Ryan, 1985).The satisfaction of basic needs is also closely related to the positive emotions experienced by players in the game (Chiang & Lin, 2010; Peng et al., 2012).Flow refers to a state of mind in which one is fully engaged in an activity and achieves an extreme level of pleasure (Csikszentmihalyi M & Perennial H, 1991). People can get flow experience through online shopping (Novak et al., 2000), games (Hsu & Lu, 2004) and online learning (Choi et al., 2007). Flow theory is frequently cited in the field of mobile online game use behavior to prove that flow experience, as a major motivation for players to participate in the game, can have a direct and effective impact on the feelings and experiences of players in the game, and will have a significant impact on the loyalty and consumption intention of game players.

3. Research Hypotheses

3.1. Influence of Social Elements on Players' Intention to Continue Using

The social elements in the game will enable the players to have social experience during the game and lead the players to have a flow experience, thus deepening the dependence of the players on mobile online games (Wang, 2017). Competition and cooperation are the most common way of two kinds of interpersonal interaction, and competition and cooperation relationship in the network game world is widespread (Frostling - Henningsson, 2009; Jansz & Tanis, 2007). In the field of game design, social collaboration is regarded as one of the most critical elements for the success of online games (Kim, Yong, & Young, 2005). In addition, the social competition factors in online games will also have an impact on the internal state of individuals, and then change the game behavior of individuals (Adachi & Willoughby, 2011). To sum up, this paper proposes the following hypothesis:

H1a: social cooperation will positively influence the intention of continuous use.

H1b: social competition has a positive effect on willingness to continue using.

H1c: there is a significant difference in the impact of the combination type of competition and cooperation on the players' willingness to continue to use. Moreover, when the level of social cooperation and social competition are both high, the players' willingness to continue to use is more likely to be triggered.

3.2. Mediating Effect of Perceptual Control and Perceptual Participation

Based on the technology acceptance model, Eunil Park et al. (2014) established a model with perceived movement, perceived control and skills as motivation factors, and verified their willingness to use mobile social network games. Social cooperation and social competition in mobile online games are often related to the perception control and participation of players in the game, and make the retention time of players in the game longer, that is, the generation of persistent use intention (Jin, Annie S A., 2012; Raphael et al., 2012). According to the self-determination theory (Deci & Ryan, 1985) and flow theory (Csikszentmihalyi M & Perennial H, 1991), the player's perceptual control and perceptual participation are satisfied by the social cooperation and social competition experienced in the game, thus increasing the player's willingness to continue using. To sum up, this paper proposes the following hypothesis:

H2a: perceive the impact of mediating social collaboration on the player's willingness to continue using. The higher the perceived involvement, the greater the player's willingness to continue using.

H2b: perception control mediates the effect of social competition on players' willingness to

continue using. The higher the perceptual control, the greater the player's willingness to continue using it.

H2c: perceive the influence of the combination type of participating mediators on the players' intention to continue using.

H2d: the effect of combination types of perceptual control mediators on players' willingness to continue using.

4. Empirical Analysis

4.1. Experimental Design and Data Collection

This study design simulation of the real mobile network game scene experiment, including social collaboration (high/low), the social competition (high/low) and the concurrence of combination type low (high/low/high/low) between groups of experimental design, selection of known degrees higher mobile network games on the market for reference, simulate real game situation. The corresponding virtual experiment scene combination and text description materials are designed. This study designed a scenario in which players play virtual games in a certain type of game, in which social cooperation (high and low) is set by "1V1" and "5V5". Social competition (high and low) is set with text such as "man-machine battle" and "actual combat". The participants were invited to participate in the experiment by sharing with friends offline. After knowing the notes and the contents of the experiment, the subjects began to read the instructions. After reading the instructions, you can enter the experiment. After browsing the above information, the subjects began to fill in the questionnaire.

A total of 728 questionnaires were sent out and 728 were returned, and 88 invalid questionnaires with incomplete and missing questions were eliminated. A total of 640 valid questionnaires were obtained, with an effective rate of 87.59%. According to previous studies, try to adopt a mature scale. This paper mainly refers to the study of Vankatesh (2010) & Lee (2009) on the measurement of social cooperation, and finally adopts three questions, such as "in the game, I can communicate with other players conveniently". The measurement of social competition mainly refers to the research of Hsu (2009) & zhang(2010), and finally adopts four questions such as "in the game, I will try my best to defeat my opponent". The perception control measurement mainly refers to the consumption perception control scale developed by Bateson (1985), "I can grasp most of the game situation in the game" and other four questions. The measurement of perceptual engagement mainly refers to the four questions of customer engagement of Claycomb (2001) & Bettencourt et al. "I often use mobile online games". The continuous use intention measurement mainly refers to three questions in Bhattacherjee's (2001) study, such as "I would recommend my favorite mobile online game to others". Likert seven-point scale was adopted.

4.2. Experiment I Data Analysis and Hypothesis Testing

The purpose of experiment 1 is mainly to verify H1. That is, there is a significant difference in the impact of social elements on players' willingness to continue using.

4.2.1. Reliability and Validity Analysis

In this study, Cronbach's coefficient was used to test the reliability of the scale. The values of each variable were greater than 0.7, indicating that the scale had a high reliability level. See the following table for details:

Table 1: Reliability analysis.

variable	multi-item	Deleted alpha value	Cronbach's α
Social collaboration	XZ1	0.752	0.743
	XZ2	0.681	
	XZ3	0.515	
Social competition	JZ1	0.832	0.827
	JZ2	0.767	
	JZ3	0.737	
	JZ4	0.793	
Willingness to continue using	YY1	0.879	0.886
	YY2	0.771	
	YY3	0.855	

All the scales adopted in this study are revised appropriately on the basis of the existing mature scales, which have good content validity. To further test the structural validity of the scale, exploratory factor analysis was carried out on the sample data after KMO sample measure and Bartlett sphere test. The results show that the factor loads are all greater than 0.8, indicating that the scale has good convergent validity and discriminant validity.

Table 2: KMO and Bartley test for continuous use.

Variable	KMO sample measure	Batley spheroid test	
Willingness to continue using	0.704	chi-square value	281.429
		Df	3
		Sig.	0.000

Table 3: Composition matrix

Variable	measured variable	factor loading	Extraction factor
Willingness to continue using	Continue using Intention 2	0.939	
	Continue using Intention 3	0.891	1
	Continue using Intention 1	0.876	

4.2.2. Hypothesis Testing

The mean values of the independent variables of social cooperation and social competition in different levels of continuous use intention were calculated. The results showed that, at the 95% confidence level, M high =5.949, M low =4.800, $p < 0.05$, M high =5.967, M low =4.083, $p < 0.001$. It can be seen that social cooperation and social competition have a positive correlation with continuous use intention, that is, the higher the social cooperation and the higher the social competition are, the stronger the players' continuous use intention is. H1a and H1b are verified.

Table 4: Main effect test results of Experiment 1

Variable	group	N	average	standard	standard error of the	Sig

Variable	grouping	N	average	standard deviation	standard error of the mean	Sig
Social collaboration	low	20	4.800	1.515	0.339	0.004
	high	20	5.949	0.759	0.170	
Social competition	low	20	4.083	1.525	0.341	0.000
	high	20	5.967	0.973	0.218	

In order to further verify the influence of different combination types of social cooperation and social competition on the intention of continuous use, this study conducted a two-factor analysis of variance with the intention of continuous use as the result variable according to the data obtained from experiment 1. As shown in table 5, M high =5.916, M high =3.717, M low =5.533, M low =4.850, p < 0.05, and H1c hypothesis was verified. Thus, H1 is verified.

Table 5: Mean difference test of influence of social competition on intention to continue using under different degrees of social collaboration.

Dependent variable: willingness to continue using						
Social collaboration	group	N	average	standard deviation	standard error of the mean	Sig
Collaboration is high	Competition is high	20	5.916	0.936	0.209	0.000
	Competition is low	20	3.717	0.945	0.211	
Collaboration is low	Competition is high	20	5.533	1.040	0.232	0.023
	Competition is low	20	4.850	0.768	0.172	

4.3. Data Analysis and Hypothesis Testing

The purpose of experiment 2 is mainly to verify H2. That is, perceptual control and perceptual participation mediate between social elements and the intention of continuous use.

4.3.1. Reliability and Validity Analysis

In this study, Cronbach's coefficient was used to test the reliability of the scale. The values of each variable were greater than 0.7, indicating that the scale had a high reliability level. See the following table for details:

Table 6: Reliability analysis.

Variable	multi-item	Deleted alpha value	Cronbach's α
Social collaboration	XZ1	0.859	0.857
	XZ2	0.776	
	XZ3	0.768	
Social competition	JZ1	0.865	0.836
	JZ2	0.760	
	JZ3	0.748	
	JZ4	0.794	

Perceived control	KZ1	0.760	0.803
	KZ2	0.760	
	KZ3	0.750	
	KZ4	0.743	
Perceptual participation	CY1	0.864	0.836
	CY2	0.748	
	CY3	0.749	
	CY4	0.799	
Willingness to continue using	YY1	0.889	0.898
	YY2	0.787	
	YY3	0.818	

After KMO sample measure and Bartlett sphere test, exploratory factor analysis was performed on the sample data. The results show that the factor loads are all greater than 0.8, indicating that the scale has good convergent validity and discriminant validity.

Table 7: KMO and Bartley test for continuous use.

Variable	KMO sample measure	Batley spheroid test	
Perceived control	0.750	Chi-square value	200.649
		Df	6
		Sig.	0.000
Perceptual participation	0.738	Chi-square value	299.738
		Df	6
		Sig.	0.000

Table 8: KMO measure of continuous use intention and Bartley sphere test.

Variable	KMO sample measure	Batley spheroid test	
Willingness to continue using	0.700	Chi-square value	315.364
		Df	3
		Sig.	0.000

Table 9: Component matrix.

Variable	measured variable	factor loading	Extraction factor
Perceived control	Perceived control 4	0.808	1
	Perceived control 3	0.803	
	Perceived control 1	0.789	
	Perceived control 2	0.778	
Perceptual participation	Perceptual participation 3	0.896	1
	Perceptual participation 2	0.884	
	Perceptual participation 4	0.818	
	Perceptual participation 1	0.685	
Willingness to continue using	Willingness to continue 2	0.949	1

Willingness to continue 3	0.895
Willingness to continue 1	0.891

4.3.2. Mediation Hypothesis Testing of Perceptual Control and Perceptual Participation

In this study, perceived participation plays an intermediary role in the process of social cooperation's influence on mobile online game players' continuous use intention. In order to test the mediating effect of perceptual participation in this process, this paper used Bootstrap method to conduct the mediating effect test. The sample size was selected as 5000. Under the 95% confidence interval, the results of the mediating test did not include 0 (LLCI=-0.6719, ULCI=-0.1232), indicating that the mediating effect of perceptual participation was significant and the mediating effect size was -0.3972. In addition, after controlling for the perceptive participation of the mediation variable, the independent variable social cooperation has no significant influence on the continuous use intention of the dependent variable, and the interval (LLCI=-0.4886, ULCI=0.1748) contains 0. Therefore, perceived participation plays a mediating role in the influence of social collaboration on continuous use intention and plays a completely mediating role. H2a is verified.

Table 10: Data results of Bootstrap mediation test for SPSS application PROCESS plug-in (Hayes2013).

DIRECT AND INDIRECT EFFECTS					
Direct effect of X on Y					
Effect	SE	t	p	LLCI	ULCI
-0.1569	0.1679	-0.9344	0.3515	-0.4886	0.1748
Indirect effect of X on Y					
Variable	Effect	BootSE	BootLLCI	BootULCI	
Perceptual participation	-0.3972	0.1414	-0.6719	-0.1232	

This study suggests that perceptual control plays an intermediary role in the process of social competition's influence on mobile online game players' continuous use intention. Under the 95% confidence interval, the results of the mediating test indeed do not include 0 (LLCI=0.3724, ULCI=0.8527), indicating that the mediating effect of perceptual control is significant and the mediating effect size is 0.5851. In addition, after controlling the perception control of mediation variables, the social competition of independent variables has a significant impact on the continuous use intention of dependent variables, and the interval (LLCI=0.3095, ULCI=1.1287) does not include 0. Therefore, perceptual control plays a mediating role in the influence of social competition on the intention of continuous use, and it also plays a partial mediating role. H2b is verified.

In this study, perceived participation and perceived control play a mediating role in the process of the impact of combination types on the continuous use intention of mobile online game players. In order to test the mediating effect of perceptual participation and perceptual control in this process, this paper adopts the same test method as the above mentioned mediating effect. The sample size is 5000, and all of them are conducted under the 95% confidence interval. Based on the data analysis in the following table, the research hypothesis H2c and H2d were verified. Thus, H2 is verified.

Table 11: SPSS application PROCESS plug-in (Hayes2013) Bootstrap intermediary test data results.

DIRECT AND INDIRECT EFFECTS					
Direct effect of X on Y					
Effect	SE	t	p	LLCI	ULCI
0.7191	0.2074	3.4667	0.0007	0.3095	1.1287
Indirect effect of X on Y					
Variable	Effect	BootSE		BootLLCI	BootULCI
Perceived control	0.5851	0.1210		0.3724	0.8527

Table12: SPSS application PROCESS plug-in (Hayes2013) Bootstrap intermediary test data results.

DIRECT AND INDIRECT EFFECTS					
Total Indirect effect of X on Y					
	Effect	BootSE	BootLLCI		BootULCI
(Low collaboration, low competition)	-0.4514	0.2350	-0.9311		-0.0125
(High collaboration, low competition)	-0.6881	0.1440	-1.0014		-0.4323
(Low collaboration, high competition)	0.4703	0.1684	0.1285		0.7980
(High collaboration, high competition)	0.6578	0.1650	0.3396		0.9868
Indirect effect of X on Y					
		Effect	BootSE	BootLLCI	BootULCI
Perceived control	(Low collaboration, low competition)	-0.6280	0.1815	-1.0189	-0.3057
	(High collaboration, low competition)	-0.1287	0.0638	-0.2860	-0.0282
	(Low collaboration, high competition)	0.2249	0.0895	0.0828	0.4479
	(High collaboration, high competition)	0.3134	0.1033	0.1047	0.5965
		Effect	BootSE	BootLLCI	BootULCI
Perceptual participation	(Low collaboration, low competition)	0.1766	0.1122	-0.0432	0.4021
	(High collaboration, low competition)	-0.5594	0.1391	-0.8863	-0.3391
	(Low collaboration, high competition)	0.2454	0.1356	-0.0089	0.5225
	(High collaboration, high competition)	0.3444	0.1228	0.1074	0.5965

5. Discussion

5.1. Research Conclusions

The purpose of this study is to study the influence of social cooperation and social competition on players' willingness to continue using mobile online games. Through the empirical analysis of this study, experiment 1 shows that when players experience high social cooperation and high social competition in mobile online games, they have the strongest intention of continuous use. However, when the degree of social cooperation and social competition in mobile online games was low, the players' willingness to continue using mobile online games was significantly lower than that of the other three groups. Experiment 2 shows that when players experience high social cooperation and high social competition in mobile online games, their perceptual control and perceptual participation are the strongest. Secondly, perception control and perception participation play a mediating effect in the influence of combination types on the continuous use intention of mobile online game players.

5.2. Theoretical Contribution and Practical Significance

Theoretical significance:

(1)further enriched the research on social elements in the field of mobile online games in marketing management. At present, there are relatively few researches on the use behavior of players in the field of game usage. This study enriches the research on the use behavior of users in the field of mobile online games, and is also a beneficial supplement to the existing research.(2) this study further analyzes the application of social elements in mobile online games and divides it into two dimensions: social cooperation and social competition. In this study, social elements are divided into two dimensions: social cooperation and social competition, and the influence of different combinations of social cooperation and social competition on players' willingness to continue to use is analyzed in detail.(3) on the basis of the theory of flow, this study combined with mobile network game players under the different social elements combination of psychological and behavioral differences, in-depth analysis of social coordination, social competition and self-esteem perceived control and perceived to players involved in the interaction of the impact, so as to reveal the overall social elements of mobile network game players the specific impact of perception.(4) based on the self-determination theory and flow theory, this paper constructs a theoretical analysis framework for the continuous use intention of mobile online game players by different combinations of social elements. Through theoretical analysis and experimental research, the relationship model of social elements, player perception and continuous use intention is constructed and verified, thus providing a systematic theoretical analysis framework for the research on the combination types of social elements in mobile online games.

Management enlightenment:

(1)social elements and their combination play an important role in mobile online games, but the current game design focuses on a certain mode, so game developers need to enhance the interest of multiple modes, enhance the different game experiences of players, and increase the player's willingness to stay.(2) mobile online game developers should deal with the matching of social cooperation and social competition in the design mode, so as to satisfy the players' perception control and participation in the game as much as possible, and increase the players' flow experience.

6. Research Limitations and Future Prospects

There are some limitations in this study: firstly, the experimental subjects are mostly concentrated in the college students, and there are few subjects in other industries, so the future research can be expanded to other groups to increase the universality. Secondly, in addition to the influence of social elements on the use intention of players, there are also factors such as the influence of personal characteristics of players, offline relationships of players, and the communication effect of social tools. Future research can consider the study of these factors. Finally, the design of the experiment is only carried out through the text, there are certain limitations on the scene, the future research can enrich the scene of the experiment. You can also add moderating variables, such as player personality, game type, and so on.

References

[1] Rossi L . Playing Your Network: Gaming in Social Network Sites[J]. Social Science Electronic Publishing, 2009.

[2] Rao V. Facebook Applications and playful mood:the construction of Facebook as a "third place"[C]// International Conference on Entertainment & Media in the Ubiquitous Era. 2008.

[3] Kirman B, Lawson S, Linehan C, et al. Improving social game engagement on facebook through enhanced socio-contextual information[C]// International Conference on Human Factors in Computing Systems. 2010.

[4] Park E , Baek S , Ohm J , et al. Determinants of player acceptance of mobile social network games: An application of extended technology acceptance model.[J]. Telematics & Informatics, 2014, 31(1):3-15.

[5] Yee N. Motivations for play in online games.[J]. Cyberpsychol Behav, 2006, 9(6):772-775.

[6] Ducheneaut N, Moore R J. The social side of gaming:a study of interaction patterns in a massively multiplayer online game[C]// Acm Conference on Computer Supported Cooperative Work. 2004.

[7] Choi D S, Kim J W. Why People Continue to Play Online Games: In Search of Critical Design Factors to Increase Customer Loyalty to Online Contents.[J]. CyberPsychology & Bhavior, 2004, 7(1):11-24.

[8] Lee M C , Tsai T R . What Drives People to Continue to Play Online Games? An Extension of Technology Model and Theory of Planned Behavior[J]. International Journal of Human-Computer Interaction, 2010, 26(6):601-620.

[9] Kim, Yong, Young, et al. What makes people experience flow? Social characteristics of online games[J]. International Journal of Advanced Media & Communication, 2005, 1(1):76-92.

[10] Aki Järvinen. Game design for social networks:interaction design for playful dispositions[C]// 2009.

[11] Hsu S H , Wen M H , Wu M C . Exploring user experiences as predictors of MMORPG addiction[J]. Computers & Education, 2009, 53(3):990-999.

[12] Bateson J E. Self-service consumer: An exploratory study.[J]. Journal of Retailing, 1985, 61:49-76.

[13] Brodie R J, Hollebeek L D, Jurić B, et al. Customer Engagement[J]. Journal of Service Research, 2011, 14(3):252-271.

[14] Hollebeek L D, Glynn M S, Brodie R J. Consumer Brand Engagement in Social Media: Conceptualization, Scale Development and Validation[J]. Journal of Interactive Marketing, 2014, 28(2):149-165.

[15] Brodie R J, Ilic A, Juric B, et al. Consumer engagement in a virtual brand community: An exploratory analysis[J]. Journal of Business Research, 2013, 66(1):105-114.

[16] Schuurman D, Moor K D, Marez L D, et al. Fanboys, competers, escapists and time-killers:a typology based on gamers' motivations for playing video games[C]// International Conference on Digital Interactive Media in Entertainment & Arts. 2008.

[17] Deci E L . Intrinsic Motivation and Self-Determination[M]// Intrinsic Motivation and Self-Determination in Human Behavior. Springer US, 1985.

[18] Peng W, Lin J H, Pfeiffer K A, et al. Need Satisfaction Supportive Game Features as Motivational Determinants: An Experimental Study of a Self-Determination Theory Guided Exergame[J]. Media Psychology, 2012, 15(2):175-196.

[19] Csikszentmihalyi M , Perennial H . Flow: the psychology of optimal experience[J]. Design Issues, 1991, 8(1):75-77(3).

[20] Frostling-Henningsson M. First-person shooter games as a way of connecting to people: "brothers in blood" [J]. CyberPsychology & Behavior, 2009, 12(5):557-562.

[21] Adachi P J C, Willoughby T. The effect of video game competition and violence on aggressive behavior: Which characteristic has the greatest influence?[J]. Psychology of Violence, 2011, 1(4):259-274.Csikszentmihalyi M ,

Perennial H . Flow: the psychology of optimal experience[J]. Design Issues, 1991, 8(1):75-77(3).

[22] Hsu S H , Wen M H , Wu M C . Exploring user experiences as predictors of MMORPG addiction[J]. Computers & Education, 2009, 53(3):990-999.