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Determinants of players' stickiness in online sports simulation games: Evidence from China

Yan Yang[1], Shan Jin[2]

[1]School of Sports Science and Engineering, East China University of Science and Technology, People's Republic of China
[2]School of Business, East China University of Science and Technology, People's Republic of China

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Leveraging uses and gratification theory, we explored the key determinants of players' stickiness in online sports simulation games (OSSG). We collected data in China through an online survey and used structural equation modeling to test the hypotheses. The results revealed that gratification of both enjoyment and achievement needs were key antecedents to players' stickiness in OSSG, and the role of enjoyment was stronger than that of achievement. Players' sports knowledge and the fantasy level of OSSG had a significant positive impact on gratification of both needs, whereas players' fanship and novelty level of OSSG had a significant positive influence on enjoyment need gratification. This study contributes to e-sports research by uncovering the motivations for stickiness in OSSG and by extending uses and gratification theory in e-sports context.

Keywords
online sports simulation games, enjoyment, achievement, needs gratification, player stickiness

Article Highlights

- Gratification of players' enjoyment and achievement needs was found to contribute greatly to players' stickiness in online sports simulation games.
- Players' perception of the sports knowledge, fanship, fantasy, and novelty of online sports simulation games all positively affected gratification of their need for enjoyment.
- Players' sports knowledge of and fantasy perception in online sports simulation games positively affected the gratification of their need for achievement.

Driven by the prospective growth of e-sports, many studies have been conducted to explore players' motivations for playing these games, considering e-sports as a homogeneous category (Pizzo et al., 2018; Qian et al., 2020). However, it has been found that people's motivations for playing a specific e-sport vary by type. Jang and Byon (2020) found that hedonic motivation, habit, and price value were significant factors driving gameplay intention in the simulation e-sports context, and that hedonic motivation, habit, and effort expectancy were significant motivations for physical enactment e-sports. Similarly, Pizzo et al. (2018) argued that players' motivation to attend sport simulations were more closely related to physical sports than to other e-sports.

As one of the most popular online sports genres, *online sports simulation games* (OSSG) comprise sports-themed online games that emulate real-life sports, such as Madden NFL, NBA 2K, and the FIFA series. In these games, players choose in-game avatars that represent real athletes and conform to rules that mimic those associated with the real-life sports (Kim & Ross, 2006). Players can recreate historical races; they can also create their own races using avatars that

CORRESPONDENCE Yan Yang, School of Sports Science and Engineering, East China University of Science and Technology, 130 Meilong Road, Xuhui District, Shanghai, 200237, People's Republic of China. Email: yangyan@ecust.edu.cn

perform according to the athletes' actual abilities and the conditions of the racetrack or sports field. Despite the popularity of OSSG in recent years (Jang & Byon, 2020), little is known about players' motivations for their continued use of these games. To fill this gap we analyzed data collected from recreational players of different OSSG in China to examine the determinants of players' *stickiness*, which refers to their willingness to return to and prolong their duration of each stay in the online game (Wu et al., 2010). Our results will deepen understanding of how players form the intention to play and loyalty toward OSSG, and will help game practitioners to develop more successful sports games products and effective strategies for marketing these.

Uses and gratifications theory has been applied extensively to understand media use and how and why people utilize a particular medium (Hamari & Sjöblom, 2017; Qian et al., 2020). According to this theory, people select the medium according to their purpose, and their choice depends on the extent to which each medium fulfills their specific needs (Qian et al., 2020). For more than a decade, uses and gratifications theory has been acknowledged as highly suitable for research on e-sports games (Wu et al., 2010). As OSSG comprise typical sports-themed games in online settings, uses and gratification theory could offer a better understanding of players' use intentions regarding OSSG. Researchers have identified three main gratifications that drive online game players—enjoyment, achievement, and social interaction (Wu et al., 2010). Weiss and Schiele (2013) posited that social interaction is a consequence of, and not a motivation for, engagement in the virtual world and does not have a significant impact on e-sports gameplay intention. Thus, in this study we did not address this factor. Given that e-sports content attributes and individual characteristics account for e-sports experience and consumption (Martončik, 2015), we further posited two personal characteristics (sports knowledge and fanship) and two game features (fantasy and novelty) as the antecedents of players' need gratifications, which ultimately affect players' stickiness to OSSG. Figure 1 shows the research model.

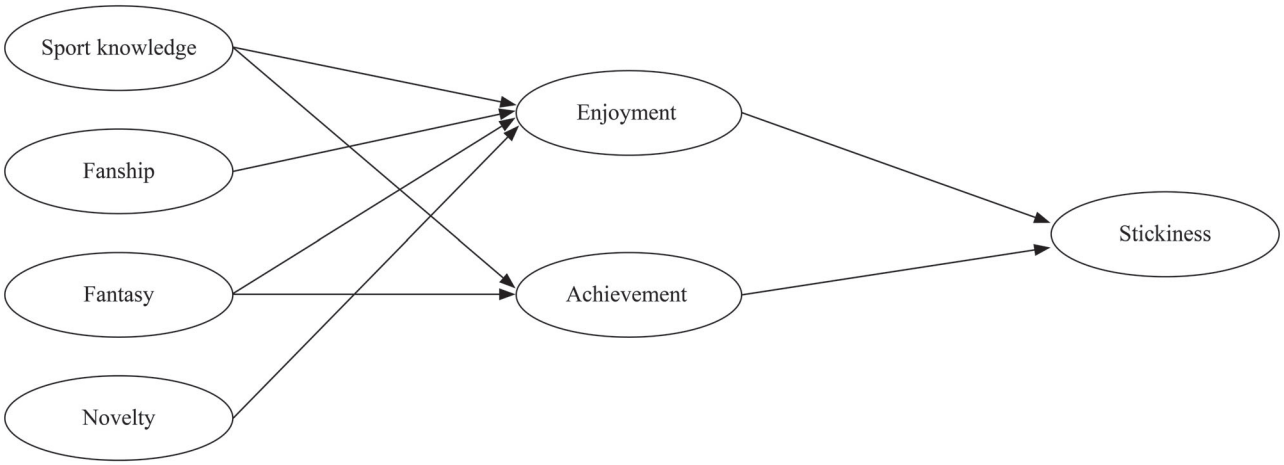

Figure 1. *The Proposed Research Model*

The Current Study

Enjoyment, which is the process of experiencing satisfaction, joy, and pleasure while executing a specific action or behavior (Bueno et al., 2020), has been identified as the main hedonic motivation for individuals' initial acceptance and continued use of information technology, including online games (Merikivi et al., 2017). Enjoyment is viewed as the core experience of video games, regardless of the outcome (Touati & Baek, 2018). When they are driven by intrinsic motivation, such as enjoyment, individuals are more willing to adopt and continue to engage in online games (Merhi, 2016; Touati & Baek, 2018). In line with this sequence of events, several studies have confirmed that enjoyment is a strong determinant of online game consumption, including adoption intention for online games (Merikivi et al., 2017),

playing online games (Wu et al., 2010), watching live streams on the internet (e-sports spectating; Pizzo et al., 2018), and e-sports gameplay (Jang & Byon, 2020). OSSG emulate real-life sports and provide an ideal channel to experience enjoyment from both real-life sports and online games. In this context, fun seeking is expected to be one of the dominant drivers of continuing to use a virtual world such as an OSSG. Hence, we proposed the following hypothesis:
Hypothesis 1: Enjoyment will positively affect players' stickiness in online sports simulation games.

Achievement reflects the desire to pursue excellence, gain power, and—in the context of OSSG—to compete successfully with other players (Wu et al., 2010). The desire to achieve is manifested in individuals' efforts to persist and tackle difficult tasks; in OSSG it represents players' internal desire to persevere and engage in multiple attempts to master the game (Touati & Baek, 2018). Compared with the real world, virtual worlds provide more attractive features with salient rewards for obtaining power (Fang et al., 2009). In the OSSG context players access an alternative world where they can satisfy desires that they cannot achieve in the real world, such as acting, sports stunts, controlling their favorite real-life players or teams, and successfully managing a top sports club. People continue to play games online if they receive consistent positive feedback about their performance from the game system (Merhi, 2016). Thus, satisfying the need for achievement is likely to be another predominant motivation for OSSG stickiness. Hence, we proposed the following hypothesis:
Hypothesis 2: Achievement will positively affect players' stickiness in online sports simulation games.

Knowledge of online sports games determines players' performance and, correspondingly, the enjoyment they draw from such games (Sell et al., 2008). Skilled players with developed competencies enjoy gaming more than unskilled players do (Bányai et al., 2019). People who lack background knowledge about a given game and its rules may find it difficult to enjoy playing the game and to play it well. For example, people who know little about football can hardly experience the fun of managing a football club and manipulating top football stars. Thus, the application of sports knowledge has been identified as a strong predictor in determining e-sports events attendance (Jang & Byon, 2020). OSSG provide individuals with the opportunity to apply their sports knowledge, skills, and strategies to virtual games, a process that is associated with both enjoyment and achievement. Thus, we proposed the following hypotheses:
Hypothesis 3: Sports knowledge will positively affect players' enjoyment level in online sports simulation games.
Hypothesis 4: Sports knowledge will positively affect players' achievement level in online sports simulation games.

Fanship refers to individuals' self-perceived level of interest in or affinity for the target sport (Billings & Ruihley, 2013). In general, people's sport consumption behavior is highly affected by their interest in the target sport. Online sports game players are usually fans of real-life sports (Jang & Byon, 2020). Notably, people who play (vs. do not play) e-sport simulation games are more likely to be fans of real-life sports (Kim & Ross, 2006). According to social identity theory (Tajfel & Turner, 1986), sports fans behave in congruence with their identity and consume sports through various channels (Rynarzewska, 2018). OSSG provide fans with an opportunity to develop and sustain an attachment to their favorite sport. Consequently, they draw great enjoyment from supporting and engaging in their favorite sport. Hence, we advanced the following hypothesis:
Hypothesis 5: Sports fanship will positively affect players' enjoyment level in online sports simulation games.

In the context of OSSG, *fantasy* refers to users engaging in a creative, imaginative, or even fantasized world of play (Kim & Ross, 2006). Fantasy is a strong predictor in determining the initial and sustained use of online games in different genres (Wu et al., 2010). In the fantasy-themed online games context, players can perform activities unlike those in real-life sports (Wu et al., 2010). OSSG establish a fantasy world that is otherwise out of reach for most people. In doing so, players can accomplish various tasks that are unattainable in real-life sports (Li et al., 2015). In this context, players derive feelings of achievement by engaging in amazing feats, such as attempting a sport stunt, coaching a top basketball club, and even playing in the FIFA World Cup Final. Hence, the fantasy experienced while playing OSSG is likely to affect individuals' enjoyment and achievement levels, and we suggested the following hypotheses:
Hypothesis 6: Fantasy will positively affect players' enjoyment level in online sports simulation games.
Hypothesis 7: Fantasy will positively affect players' achievement level in online sports simulation games.

Novelty in the context of OSSG refers to the perception of the game as surprising and unfamiliar (Huang et al., 2017), such as seeing new players and teams on the sport scene (Bányai et al., 2019). Novelty is one of the primary factors

driving people's intrinsic motivation, evoking their interest, and motivating their exploratory behavior (Deci & Ryan, 2000). The introduction of novelty in OSSG through the frequent inclusion of new features and progressions in game design can promote perceived enjoyment, which, in turn, enhances players' continued use of mobile games (Merikivi et al., 2017). Nevertheless, even satisfied players may switch to consuming alternative games owing to a desire for novelty (Li et al., 2015). In OSSG, novel elements are expected to satisfy players' need for fun, leading us to form the following hypothesis:

Hypothesis 8: Novelty will positively affect players' enjoyment of online sports simulation games.

Method

Participants and Procedure

We conducted a survey on Sojump (http://www.sojump.com), using the paid sample service of this website to recruit survey participants who were Chinese residents ranging between 18 and 65 years of age. Filtering questions were used to identify people who had downloaded and played OSSG in the 6 months prior to the time of the survey. Those who had played only other online games related to sports, such as chess and cards, were excluded from the sample. We recruited 1,330 participants within 10 days. Among the survey forms that were returned, 294 were disqualified, because the respondents had completed the survey in less than the baseline time, missed important items, or used continuous-answer techniques.

Measures

All measures were adopted from existing research and adapted to the OSSG context. A bilingual research assistant translated the measures into Chinese. The measures were then back-translated into English by another bilingual research assistant. Translation discrepancies were resolved through further discussion with these bilingual experts. All items were measured on a 5-point Likert scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

Stickiness

The behavioral construct of stickiness was measured through the frequency of playing and adapted as described above from Chen et al. (2018) and Wu et al. (2010). This scale includes three items, such as "I will continue playing OSSG in the future." In this study Cronbach's alpha was .84.

Needs Gratification

Enjoyment was measured using a three-item scale adopted from Billings and Ruihley (2013): "Playing OSSG is fun," "Playing OSSG is a hobby of mine," and "Playing OSSG is enjoyable." Cronbach's alpha was .82 in this study.

Achievement was measured using a four-item scale adopted from Wu et al. (2010). A sample item is "I have more power than other players in OSSG." Cronbach's alpha was .85 in this study.

Player Characteristics

We used a three-item scale adapted from Kim and Ross (2006) to measure players' sport knowledge application. A sample item is "I simulate my strategies when playing OSSG." Cronbach's alpha was .81 in this study.

We used a three-item scale adapted from Billings and Ruihley (2013) to measure players' fanship. A sample item is "I am a huge fan of OSSG in general." Cronbach's alpha was .79 in this study.

Features of Online Sports Simulation Games

We used a three-item scale adapted from Li et al. (2015) to measure the fantasy level of OSSG players: "I pretend I am someone/somewhere else when playing OSSG," "I play OSSG to experience things I do not experience in daily life," and "I play OSSG to immerse myself in the lives of the game world." Cronbach's alpha was .81 in this study.

We used a four-item scale adapted from Merikivi et al. (2017) to measure the novelty level of OSSG. A sample item is "The game I most often play is imaginative." Cronbach's alpha was .80 in this study.

Data Analysis

We used SPSS 21.0 and Amos 27.0 for descriptive statistical analysis and correlation analysis. The data analysis was conducted in two stages. First, we performed a confirmatory factor analysis with maximum likelihood estimation to test for convergent and discriminant validity. We then used structural equation modeling to test the hypothesized relationships.

Results

To examine the measurement model, statistical assumptions of outliers, normality, and linearity were tested. Skewness and kurtosis values (all between −1 and 1) were below than the suggested maximum criteria, indicating there was no normality issue. No outliers were found through calculating z scores and Mahalanobis distance. All correlation values were below .85 and variance inflation factors were below 5.0, which indicated that there was no multicollinearity issue. Reliability and validity results are shown in Table 1.

Table 1. *Reliability and Validity Testing*

Items		Factor loadings	α	AVE	CR
Knowledge	KNOW1	.69	.81	.52	.81
	KNOW2	.70			
	KNOW3	.79			
	KNOW4	.70			
Fanship	IDEN1	.71	.80	.53	.82
	IDEN2	.78			
	IDEN3	.68			
	IDEN4	.74			
Fantasy	FAN1	.74	.81	.59	.81
	FAN2	.81			
	FAN3	.75			
Novelty	NOVEL1	.70	.80	.52	.81
	NOVEL2	.73			
	NOVEL3	.77			
	NOVEL4	.67			
Enjoyment	ENJOY1	.82	.82	.61	.82
	ENJOY2	.74			
	ENJOY3	.78			
Achievement	ACHIE1	.80	.85	.59	.85
	ACHIE2	.76			
	ACHIE3	.75			
	ACHIE4	.78			
Stickiness	STICK1	.80	.84	.64	.84
	STICK2	.80			

Note. AVE = average variance extracted; CR = composite reliability.

We employed two methods to check for common method bias. First, we used Harman's single-factor test by conducting a principal component analysis. The results showed that the data contained seven dimensions, and the first factor explained 33.93% of the variance before rotation, which is less than the critical criterion of 50%. Second, the correlation matrix of constructs in Table 2 shows that all correlation coefficients were less than .64. These results indicate the absence of any serious common method bias.

Measurement Model

The results of confirmatory factor analysis showed a good fit to the data, $\chi^2/df = 2.60$, $p < .001$; root-mean-square error of approximation (RMSEA) = .05, comparative fit index (CFI) = .95, normed fit index = .92, goodness-of-fit index = .93. Table 1 shows the seven factors that were extracted had Cronbach's alpha levels greater than .80; further, the composite reliability for all constructs varied between .81 and .85, and average variance extracted values ranged between .52 to .64, indicating good convergent validity. Table 2 shows all correlation coefficients between each construct and the other constructs were smaller than the square roots of average variance extracted, indicating good discriminant validity.

Table 2. *Descriptive Statistics and Correlations of Study Constructs*

Construct	*M*	*SD*	1	2	3	4	5	6	7
1. Knowledge	3.82	0.69	.89						
2. Fanship	3.93	0.68	.61***	.88					
3. Fantasy	3.55	0.63	.40***	.41***	.89				
4. Novelty	3.74	0.74	.48***	.49***	.59***	.89			
5. Achievement	3.27	0.84	.49***	.45***	.52***	.53***	.92		
6. Enjoyment	3.68	1.00	.45***	.38***	.56***	.43***	.64***	.91	
7. Stickiness	3.84	0.78	.48***	.45***	.51***	.49***	.66***	.55***	.92

Note. Diagonal elements are the square root of the shared variance between the constructs and their measures; correlations appear below the diagonal.
*** $p < .001$.

Structural Model

The goodness-of-fit indices suggested that the model fit the data reasonably well, χ^2 (253) = 681.90, $p < .001$, χ^2/df = 2.70, RMSEA = .05, CFI = .95, nonnormed fit index = .92, incremental fit index = .95. As predicted, both enjoyment and achievement were significantly and positively associated with players' stickiness, thereby supporting Hypotheses 1 and 2. Moreover, enjoyment had greater predictive power than achievement did for stickiness (see Table 3).

Table 3. *Hypothesis Testing Results*

Hypotheses	Unstandardized coefficients	*SE*	Estimate	*t*	Result
H1: Enjoyment → Stickiness	.55	.06	.55	9.94	Supported
H2: Achievement → Stickiness	.18	.05	.21	3.96	Supported
H3: Knowledge → Enjoyment	.27	.06	.24	4.33	Supported
H4: Knowledge → Achievement	.19	.07	.14	2.59	Supported
H5: Fanship → Enjoyment	.12	.06	.11	2.04	Supported
H6: Fantasy → Enjoyment	.35	.06	.26	4.98	Supported
H7: Fantasy → Achievement	.25	.05	.31	5.78	Supported
H8: Novelty → Enjoyment	.28	.07	.22	3.92	Supported

As shown in Table 3, sports knowledge, fanship, fantasy, and novelty each had a significant effect on enjoyment. Thus, Hypotheses 3, 5, 6, and 8 were supported. As for the antecedents of achievement, the impacts of sports knowledge and fantasy were confirmed, thereby supporting Hypotheses 4 and 7.

Discussion

We used the framework of uses and gratification theory to develop a hypothesized model to examine the effects of players' characteristics (i.e., sports knowledge, fanship) and game features (i.e., fantasy, novelty) on players' enjoyment and achievement, and, in turn, how these influenced stickiness in OSSG. We found that both enjoyment and achievement significantly and positively affected users' stickiness. This finding provides support for Weiss and Schiele's (2013) notion that gratification of both competitive and hedonic needs drives players' motivation to continue e-sports use. Moreover, the results in our study validated the impact of the player characteristics of sports knowledge and fanship on enjoyment. These results are consistent with those of previous studies, in which it was found that simulation e-sports games' fans are likely to be real-sport fans (Kim & Ross, 2006), and that if players master adequate sports knowledge and are fully invested in the target sport, they are likely to have more fun playing OSSG (Jang & Byon, 2020). We also found that sports knowledge increased players' achievement. This result is especially interesting and logical, as it implies that successful players of OSSG are quite different from those of other generic e-sports games, for which only a few skills are required, such as fast reaction time and vigilant monitoring (Jang & Byon, 2020). The effect of fantasy on enjoyment and achievement was also confirmed in our study. This result may be explained by the nature of the OSSG genre: emulating real-life sports offers dual pleasure originating from both playing online games and engaging in a real sport, and players perceive OSSG as a viable alternative to real-life sports to realize their competence and power.

This study contributes to existing academic research in several ways. First, contrary to the extant research in which all e-sports had been considered to be homogeneous, in this study we focused on one specific game genre: OSSG. Our findings contribute to a better understanding of the recreational online sports games market. Second, in this study we extended the uses and gratification model by incorporating both players' characteristics and game features as antecedents, to identify the game features that positively predict players' perception of the gratification of their needs for achievement and enjoyment, which, in turn, results in a firmer intention to continue using OSSG. Last, although some researchers had proposed a possible relationship of personal traits with game features and e-sports games consumer behavior (e.g. Martončik, 2015), limited empirical studies have been conducted to test the role of specific dimensions on continued use of e-sports (Baek & Touati, 2017). By revealing the relationships among these variables, the findings in our study enrich existing knowledge of how to increase OSSG players' loyalty based on players' characteristics and game design.

Our study findings highlight the key attributes of OSSG consumers: a group of experienced sport fans who are attracted by fantasy and novelty, and who seek to fulfill their achievement and enjoyment needs in the online sports game context. These findings can help practitioners better identify and target segment markets. For instance, a simple preliminary test of sports knowledge can be conducted to screen unmatched customers before their formal participation. As knowledge contributes to both enjoyment and achievement, related sports knowledge and tips can also be offered during each playing interval in the initial stages. The predominant impact of fantasy on the need for gratification of both achievement and enjoyment indicates that corporations who produce OSSG should highlight the games' fantasy features when developing and promoting products. Details representing their verisimilitude in the context of real-life sports should be emphasized. For instance, iconic moves of sports stars—such as Harden's step-back shot or Iverson's crossover—should be emulated as authentically as possible to increase the fantasy quotient of games.

This study has some limitations that provide useful directions for future research. First, a cross-sectional design may not adequately capture the dynamics of consumers' intentions. Longitudinal studies are recommended to effectively address issues such as common method bias and causality inference. Second, future researchers could include more variables, such as demographic parameters (e.g., culture, gender), players' experience, and game design aesthetics. Additionally, in this study we investigated only how to increase players' stickiness in OSSG. Other noteworthy game-consumption behaviors, such as streaming-game spectating, new-player recruitment, and in-game purchases, could also be investigated.

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