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Enhancing perceived enjoyment in social games through social and gaming factors

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Abstract

Purpose – Residing on social networking platforms, social games have unique characteristics distinguishing them from other digital games or online games. The purpose of this paper is to explore both social and gaming factors of social games and investigate their roles on enhancing perceived enjoyment. The authors also examine the relationships between perceived enjoyment, subject norm, perceived critical mass, intention to play, and actual behavior.

Design/methodology/approach – This paper develops a research model including nine hypotheses. Using a survey questionnaire, empirical data were collected from 169 actual social game players. Structured equation modeling was used to test the proposed research models.

Findings – Social identification, social interaction, and diversion significantly influence perceived enjoyment. Perceived enjoyment significantly influences the intention to play, which in turn significantly influences the actual behavior. Moreover, subject norm and perceived critical mass play different roles in determining the intention to play and the actual behavior.

Practical implications – The results of this study provide social game practitioners with a set of rich insights into guidelines on designing specific social and gaming characteristics to improve users' perceived enjoyment and actual playing behavior.

Originality/value – Through analyzing characteristics of social games, The authors emphasize the difference between social games and other online games or computer games and recognize the enhancing role of social and gaming factors on perceived enjoyment. Findings of this study contribute to the literature on social games.

Keywords Social networking (e.g. Facebook, Second Life), User participation, Web 2.0, Identity, Virtual identity, Web services

Paper type Research paper

1. Introduction

The popularity of social network services gives rises to a special type of online games called social games (Chen and Chang, 2010; Wei and Lu, 2014). As the biggest social game maker, Zynga's games have had great successes in pulling in users on Facebook. According to App Data, a website tracking activity on Facebook, "FarmVille," a social game launched in 2009, and "CityVille," launched in 2010, are among the top 15 most-used apps on Facebook (Shalvey, 2012). Mobile game developers, casual game developers, and web programmers are forging ahead with social games (Shin and Shin, 2011). Being free

to play, social games have to attract a large number of players to support their revenue models (Alha *et al.*, 2014).

Residing on social networking platforms, social games may have the capacity to serve as a unique venue for socialization in a playful manner (Hou, 2011). This distinguishes them from traditional online games. Prior research has examined the acceptance of online game from perspectives such as extended Technology Acceptance Model (TAM) (Hsu and Lu, 2004; Lee and Tsai, 2010), flow experience (Chang, 2012), and commitment (Zhou *et al.*, 2012), and most of them found that perceived enjoyment had the largest impact on user intention or behavior (Hsu and Lu, 2004; Lee and Tsai, 2010). How to enhance users' enjoyment and actual use of social games have not been adequately addressed, especially from both the gaming enjoyment and social engagement perspectives.

The objectives of this study are to: first, explore what unique social and gaming factors determine users' perceived enjoyment; and second, examine the effects of perceived enjoyment and social influence on users' intention to play and actual playing behavior in social games. To achieve these goals, we first analyzed the characteristics of social games, and explored three factors from social and gaming perspectives. Then a research model was developed combining social and gaming factors with the social influence theory. Survey results of 169 actual social game players suggest that social identification, social interaction, and diversion significantly enhance perceived enjoyment. Perceived enjoyment significantly influences intention to play, which in turn significantly influences the actual behavior. Moreover, both subject norm and perceived critical mass play significant roles in determining the intention to play and the actual behavior. This study's key contribution to research is in explaining users' perceived enjoyment, intention to play and actual playing behavior in the distinctive context of social games, and providing directions for social game makers on how to design and operate social games.

The remainder of the paper is organized as follows. The next section reviews the theories used in this study and develops the research model. It is followed by the research methodology and results. The paper ends with a discussion of the results, contributions to research and practice, and suggestions for future research.

2. Literature review, theoretical background and hypotheses
2.1 Factors influencing user behavior in social game
User behavior intention and actual behavior in online game context have been investigated largely in previous literature. Academia has also noticed that the emergence of social network games and studied them from various focussed perspectives, such as sociability, social dynamics, game design, playability, platform, playfulness, marketing, behavioral economics, player classification, uses and gratifications, and motivations (Hou, 2011; Paavilainen *et al.*, 2013; Wei and Lu, 2014).

The most widely used theory in this domain is TAM or extensive TAM. Most of these previous research found that perceived enjoyment, perceived usefulness, perceived involvement, subject norm and flow experience significantly influence behavior intention, and perceived enjoyment played most important role in driving behavior intention (Hsu and Lu, 2004; Shin and Kim, 2008; Shin and Shin, 2011). However, the antecedence of perceived enjoyment has not been completely investigated in the specific context of social game. Integrating SNS and online games, social games are a hedonic system that offers entertaining contents and playful

services. Although flow experience and other factors are also important in driving behavior intention, they are more suitable in general video game context (Lee and Tsai, 2010). Players do not consider social games very immersive. The lack of 3D virtual worlds was seen as a reason for this lack of immersion (Paavilainen *et al.*, 2013). Thus, this study focus on investigating the antecedence of perceive enjoyment in the specific context of social game.

Another research genre focussed on the motivation of users' participation in online games. As an online game, social game players are motivated to play games in order to create common ground, experience reciprocation, cope, or simply pass the time (Wohn *et al.*, 2010). The extrinsic motivation incorporate achievements (e.g. earning points, progressing, and leveling) (King *et al.*, 2011), reputation (Kowert and Oldmeadow, 2013), perceived usefulness and perceived ease of use (Chang and Chin, 2011). Immersion and escapism (e.g. using the game as a mood management tool to cope with negative emotions) are intrinsic motivations for players (Blinka and Mikuška, 2014). Perceived enjoyment is a form of intrinsic motivation (Chang and Chin, 2011).

Social factors are also important in driving users' behavior. As a social network platform, social game uses social features as deeply integrated game-playing elements, which can create a joint area of interest for future social interaction rather than seeking direct interaction in the game itself (Jin, 2014). Blinka and Mikuška (2014) indicate that social motivation for gaming, online peer attachment, and social self-efficacy can shape users' behavior in online games. Playing computer games creates online and offline social support (Trepte *et al.*, 2012), generates social capital, and subjective well-being (Jin, 2014). Social influence and network externalities are also found to be determining factors in driving users' intention and actual behavior (Hsu and Lu, 2004; Wei and Lu, 2014).

Although both gaming and social factors can predict users' behavior in social game, studies investigating the relationship between gaming and social factors, and perceived enjoyment were scant. Based on the characteristics of social games, perceived enjoyment, and the social influence theory, this study develop a research model to explore what unique social and gaming factors determine users' perceived enjoyment and examine the effects of perceived enjoyment and social influence on users' intention to play and actual playing behavior in social games.
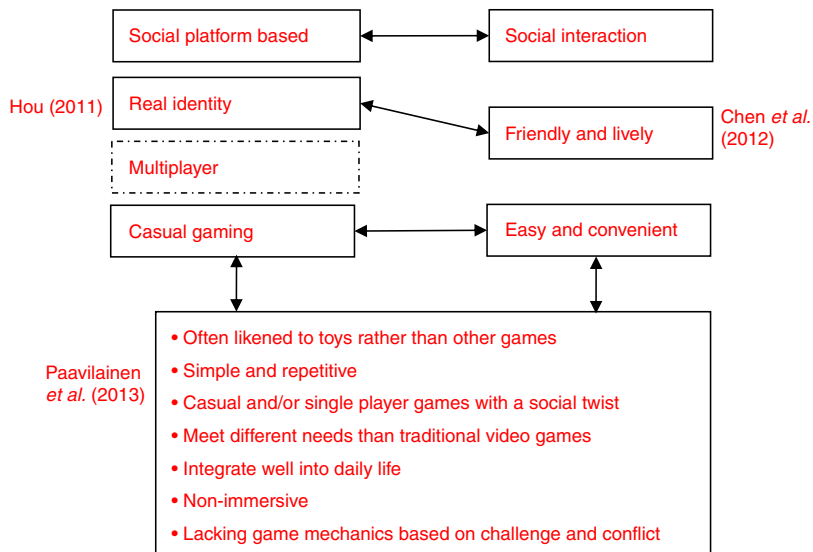
2.2 The characteristics of social game

Social network games which generally termed as "social games" refer to game applications that are embedded within social network platforms such as Facebook or MySpace (Lee and Wohn, 2012). These games are designed for playing against other players instead of against a device (Wei and Lu, 2014). People can collaborate or compete with friends to maintain their existing interpersonal relationships and to meet new friends. These interactive games can usually be experienced with more fun than single-player games (Wei and Lu, 2014). Some previous studies have analyzed characteristics that distinguish social games from other digital games or online games (Hou, 2011; Chen *et al.*, 2012). From players' perspective, Paavilainen *et al.* (2013) find seven features of social game: often likened to toys rather than other games, simple and repetitive, casual and/or single-player games with a social twist, meet different needs than traditional video games, integrate well into daily life, non-immersive, and lacking game mechanics based on challenge and conflict. These seven features demonstrate that social game is a casual game

(Juul and Revolution, 2009; Paavilainen *et al.*, 2013). Hou (2011) indicates the key components that differentiate social games from other computer games are "social platform based," "real identity," "casual gaming," and "multiplayer." Chen *et al.* (2012) finds out three most important appeal factors of social games, that are "easy and convenient," "friendly and lively," and "social interaction." Although different statement are used, they express the same meaning. Thereinto, "easy and convenient" is approximate to "casual gaming," both of which indicate social games do not require constant concentration and it is easy to install and quick to access, convenient to play for a couple of minutes every now and then, situation permitting (Paavilainen *et al.*, 2013). "Friendly and lively" is inseparable with "real identity," since playing with real friends can make social game more attractive. And "social platform based" provides sufficient social connections for players, which facilitates "social interaction." The characteristics of social game is summarized in Figure 1.

Since general online games are also played with multiple players (Hsu and Lu, 2004), this component has been investigated in many other contexts such as massive multiplayer online games (MMOG) (Szell and Thurner, 2010) and social virtual world services (Zhou *et al.*, 2012). Thus, multiplayer is not a unique characteristic of social games. Based on the other three unique characteristics of social games (e.g. social platform based, real identity, and casual gaming), we explore three factors' (i.e. social interaction, shared identity, and diversion) roles in enhancing perceived enjoyment of social games.

First, social games are embedded in social platforms such as social network sites (SNSs) and micro-blogs (Chen and Chang, 2010). This characteristic makes the dynamics of player interaction within social games different from other online games. Users in social platforms add acquaintances and are interested in looking for strangers to expand their reach (Boyd and Ellison, 2008). The primary practice of social platform services is to facilitate individuals to "articulate and make visible their social networks" (Boyd and Ellison, 2008). In social games, a player's social connections are an important

Figure 1.
The characteristics of social game

part of the game. The main game play of a typical social game involves social activities like trading, chatting, flirting, or mischief-making (Hou, 2011). Unlike other online games or casual games where users play alone and titles cost a fee to download, social games are built to be enjoyed, and shared with friends through existing social network platforms (Shin and Shin, 2011). In other words, social activities taking place within a game's design provide social interactions among players in whatever manner the game affords, be it fighting, cooperating, or romancing.

In this study, social interaction refers to the interaction between two or more users. The social reason for playing games is intriguing. In social games, players want to interact with friends and to keep up social connections through these games. Social game design is not about creating a game that is strategically deep as much as it is about making sure that the game, in turn, creates interesting interactions between players (Hou, 2011). From the gaming perspective, interaction is considered one of the most important aspects of optimal experience with computer games (Chang, 2012). Interaction in social games may include expressions of encouragement, excitement, or frustration or the exchange of strategies and tips about games, all of which can be highly reinforcing. Such interactions have been found to have substantial impacts on the perceived enjoyment of games because a set of several sequences of interactions is a narrative or storytelling used to construct a play experience (Choi and Kim, 2004). Chang (2012) also indicates that players' enjoyment comes from interactions with other people.

Therefore we propose the social platform-based characteristic of social games facilitates social interaction among players, which enhances perceived enjoyment of social games:

H1. Social interaction is positively related to users' perceived enjoyment in social games.

Second, social network platforms also provide users with an identity to use in their games. This means social game players do not need to subscribe to anything extra (Hou, 2011).The majority of social game players are playing with people in their existing friendship networks such as friends, family, and co-workers (Lee and Wohn, 2012). This distinguishes social games from MMOGs which are mostly played with online friends outside of the players' offline networks. Most SNS users register with their real names so that their friends can find them. As such, social game players usually use real-name identities.

Playing within existing networks results in less anonymity between players, therefore it involves more considerations on identity management. This characteristic results in users' belief that "all friends had social game accounts" thus they do not feel isolated, creating a shared identity (Hou, 2011). One area important to make an identity salient is contacts with others associated with that identity. In general, the more an individual has contacts with others, the greater attractiveness they see with it and the stronger the identification is felt. In this case, users' shared identity makes social games complementary with the SNS. According to Zhao and Lu (2012), the complementary with other services allows users experience more fun. Playing with friends was considered more fun than playing with strangers (Paavilainen *et al.*, 2013). Users in social games have more opportunities to join events or activities with their friends and feel belonging to the group, thus decreasing the likelihood of feeling being left out. The shared identity experiences in social games can result in more user enjoyment. Hence, we hypothesize:

H2. Shared identity is positively related to users' perceived enjoyment in social games.

Third, most social games are considered casual games, characterized by easy learning curves, and less continuous time and efforts (Juul and Revolution, 2009; Lee and Wohn, 2012). Being casual in game features means that social games are easy to be picked up as opposed to intense and complex hardcore games. However, casual does not mean less time devotion: 68 percent of social game players in the USA play more than once per day, and 28 percent playing more than six hours per week (Lee and Wohn, 2012). Players forget the real-life problems they have, vent and relieve stress, and feel relaxed when they are playing social games, which is termed as diversion (Kim and Ross, 2006; Hou, 2011). The experiential values of playing social games include playing (gaming) and entertainment (having fun and relaxation), as well as getting away from real life (Zhou *et al.*, 2011). Kim and Ross (2006) also identified diversion as an important motivation of users' game play.

The entertainment component is embedded in social games in the form of exploration, game playing, escapism, and fantasy. The casual characteristic of social games facilitates users to pass time or stop boredom, which makes diversion an important factor in enhancing users' perceived enjoyment of social games. In addition, being casual, players of social games can try several games, and chose the ones they liked. When they get bored with a game, they simply move on to the next one (Paavilainen *et al.*, 2013). Hence, we hypothesize:

H3. Diversion is positively related to users' perceived enjoyment in social games.

The relationships between the characteristics and social and gaming factors are summarized in Figure 2.

2.3 Perceived enjoyment

Studies of SNSs and general online games found the important role of hedonic value in determining usage behaviors (Yang and Lin, 2014). Perceived enjoyment is defined as the extent to which the activity of using the technology is "perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated" (Van der Heijden, 2003; Lee and Tsai, 2010). On one hand, studies of SNSs have found the important role of perceived enjoyment in determining usage behaviors (Van der Heijden, 2003; Han and Windsor, 2011). On such websites, a user's perceived playfulness or enjoyment comes from the person's interaction with environmental factors. On the other hand, online games are a type of entertainment-oriented technology that is different from traditional task-oriented technology (Lee and Tsai, 2010). People play online games for pleasure and entertainment rather than achieving specific goals or improving job performance. Players' enjoyment is the single most important goal for online games (Shin, 2010; Wei and Lu, 2014). Integrating SNS and online games, social games are a hedonic system that offers entertaining contents, and playful services.

Figure 2.
Relationships between the characteristics and social and gaming factors
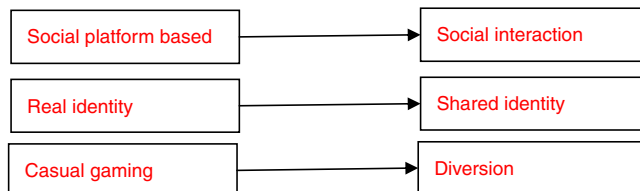
Perceived enjoyment in this study is similar to playability, which is used in popular game criticism to indicate the extent to which a certain game has the capability to provide enjoyment for a player over an extended period. From a motivation perspective, people make an effort to use information technology due to both intrinsic and extrinsic reasons (Lee and Tsai, 2010). Intrinsic motivation refers to the pleasure and entertainment from performing a behavior, whereas extrinsic motivation emphasizes performing a behavior to achieve specific goals or rewards. Because social games are hedonic systems for entertainment, the current work considers the main purpose of playing social games as pleasure, and perceived enjoyment is theorized to influence usage intention directly (Van der Heijden, 2003). Hence, we hypothesize:

H4. Perceived enjoyment is positively related to users' intention to play social games.

2.4 Social influence

Social influence measures how other people's attitudes or opinions may affect an individual's decision-making (Liang *et al.*, 2011). It has been widely used to explain users' behaviors (Cheung *et al.*, 2010; Chen *et al.*, 2013). For example, in the theory of reasoned action (TRA), a person's behavioral intentions are influenced by subjective norms as well as attitude (Fishbein and Ajzen, 1980). Innovation diffusion research also suggests that user adoption decisions are influenced by a social system beyond an individual's decision style and the characteristics of the technology (Rogers, 2003).

From social psychological and economic perspectives, two types of social influence are distinguished: social norms and critical mass (Hsu and Lu, 2004). Social norm is a popular construct to measure social influence and is a key element in theories such as the TRA and the planned behavior theory. Social norms consist of two distinct influences: normative influence, which occurs when a person conforms to the expectations of others to obtain a reward or avoid a punishment, and informational influence, which occurs when a user accepts information obtained from other users as evidence about reality (Hsu and Lu, 2004). In social games, users may feel that they need to play social games if they think their friends want them to do. To do this, they can accept feedbacks from others and avoid being isolated from their friends. Critical mass refers to the fact that the value of a technology to a user increases with the number of its adopters (Hsu and Lu, 2004). As smart phones' popularity increased, they became increasingly valuable, attracting more users to adopt the technology. In social games, the perception of a critical mass is developed through interactions with others and is rapidly strengthened as more people participate in these games. Users may feel obligated to play social games if most people around them play social games frequently. They may even feel stressed if they do not do so. Social factors profoundly impact user behaviors and behavior intention (Hsu and Lu, 2004). Hence, we hypothesize:

H5. Subject norm is positively related to users' intention to play social games.

H6. Perceived critical mass is positively related to users' intention to play social games.

H7. Subject norm is positively related to users' actual playing behavior of social games.

H8. Perceived critical mass is positively related to users' actual playing behavior of social games.

Research on the TRA (Fishbein and Ajzen, 1980) and TAM (Davis, 1989) has consistently found strong empirical support for the relationship between intention and the actual behavior. The best predictor of behavior is intention, which is the cognitive representation of a person's readiness to perform a given behavior (Shin and Shin, 2011). Van der Heijden (2003) indicates that the intention to play online games is the sole determinant of actual playing behavior. Hence, we hypothesize:

H9. Users' intention to play social games has a positive influence on the actual playing behavior.

The research model is depicted in Figure 3.

3. Research methodology

3.1 Survey administration

To test the hypotheses, we conducted a web-based survey with actual players of social games on Renren (www.renren.com), a social network website in China. Established in 2005, Renren is one of the "most popular, most open, and best-financed social network" sites in China (Men and Tsai, 2011). Nicknamed the "Facebook of China," Renren is considered to be the Chinese equivalent of Facebook in terms of interface design (Men and Tsai, 2011). Similar to Facebook, Renren provides many popular social games. One example is Happy Farm, which had millions of monthly active players at its peak.

The survey was conducted in December, 2012. A survey hyperlink was placed on Renren forums for two weeks to solicit participants. The hyperlink could be shared by users thus could spread through the SNS. To attract more participants, each respondent was given one yuan reward for her participation. We paid respondents through a third party payment platform called Alipay. To ensure that only one response was submitted per respondent, each participant's internet protocol address and demographic information were collected and carefully examined. To ensure every respondent was an actual user of social games, we asked them to provide the screenshot of the social game they played most often. In total,
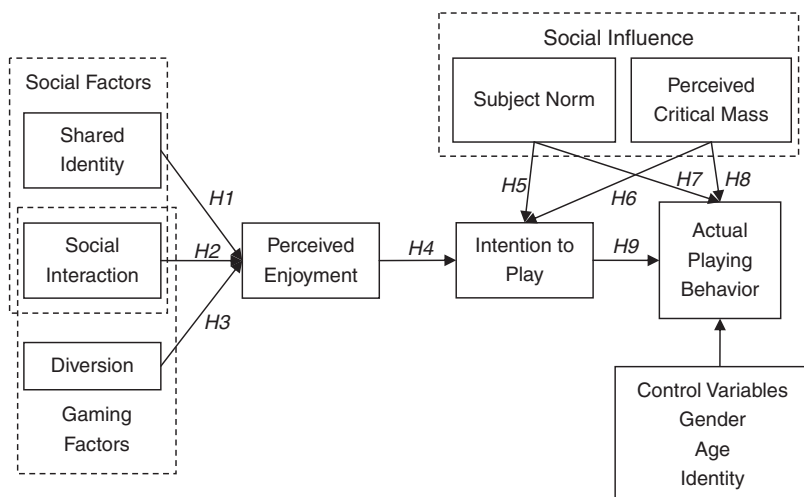
Figure 3.
The research model

182 Renren.com users completed the online survey. A pilot test of 20 subjects suggested that at least five minutes were needed to complete the questionnaire. Thus, 13 questionnaires completed in less than five minutes were abandoned. There were 169 valid questionnaires retained. The sample demographic information is summarized in Table I.

3.2 Measurements

The research model includes eight constructs. The measurement items employed in this study were adapted from previously validated scales. We made slight modifications so that these items suit the context of this study. All survey items except actual playing behavior were measured on a 7-point scale with anchors ranging from "strongly disagree" (1) to "strongly agree" (7).

The three factors we explored based on characteristics of social games have been previously investigated in other contexts. Social interaction was measured by items derived from Lee and Tsai (2010) and Lucas and Sherry (2004). Shared identity and diversion were measured by adapting items in Hou (2011) and Lucas and Sherry (2004). Subject norm, perceived critical mass, and perceived enjoyment have been widely studied in the information systems domain. Items for perceived enjoyment and subject norm were adapted from prior work on online games by Lee and Tsai (2010). Perceived critical mass was measured by items obtained from Hsu and Lu (2004). And measures of users' intention to play social games were adapted from previous studies using TAM, mainly from Davis (1989). Adapted from Hou (2011), measures of users' actual social games playing behavior reflect three aspects: the frequency of game play, the duration of game play, and the engagement of gaming activities. Items for constructs used in this study are listed in Table AI.

Because the survey was conducted in China, a back-to-back translation process was applied to the survey instrument to ensure that meanings of the questions were accurately captured by the Chinese version. This was followed by another pilot study conducted with a sample size of 30 to judge the applicability of the instrument items. Following the pilot test, minor changes were made to the wordings of the items used in the survey.

3.3 Control variables

To safeguard against rival explanations, we specified various sample characteristics which might influence users' behaviors on a social platform as control variables. They

Category	Item	Frequency	%
Gender	Male	74	43.8
	Female	95	56.2
Age	≤19	17	10.1
	20-29	96	56.8
	30-39	45	26.6
	≥40	11	6.5
Education	High school or below	12	7.1
	Junior college	54	32.0
	Undergraduate	94	55.6
	Graduate or above	9	5.3
Identity	Students	69	36.7
	Non-students	113	63.9

Note: $N = 169$

Table I.
Demographics of
survey respondents

include age (Nosko *et al.*, 2010), gender (Thelwall *et al.*, 2010), and identity (i.e. student or non-student). Renren is a social platform initially designed for students on campus, and was later expanded to other populations. Students may have more leisure time to participant in social games than non-students.

4. Results

The proposed model was assessed using partial least squares (PLS) analysis – a structural equation modeling technique that concurrently tests the psychometric properties of each measurement scale and analyzes the strength of relationships among constructs (Chin, 1998). The primary reasons for using the PLS technique is that, PLS has less stricter requirements on sample size and residual distributions than covariance-based SEM techniques such as AMOS or LISREL (Chin *et al.*, 2003).

4.1 Measurement model

Assessment of the measurement model includes the evaluation of reliability, convergent validity, and discriminant validity. We assessed the reliability of the eight constructs with Cronbach's α, composite reliability (CR), and the significance of item loading (see Table II). All constructs in our study achieved scores above the recommended value of 0.7 for Cronbach's α and CRs. And all item loadings were significant at the 0.001 level (Chin, 1998).

Construct	Indicator	Mean	SE	Factor loading[a]	Cronbach's α	CR	AVE
Intention to play	IP1	0.385	0.018	0.941	0.929	0.955	0.875
	IP2	0.337	0.015	0.923			
	IP3	0.350	0.015	0.942			
Perceived enjoyment	PE1	0.326	0.020	0.880	0.885	0.930	0.815
	PE2	0.392	0.016	0.940			
	PE3	0.390	0.018	0.888			
Perceived critical mass	PCM1	0.398	0.034	0.925	0.913	0.945	0.852
	PCM2	0.345	0.021	0.942			
	PCM3	0.339	0.032	0.902			
Subject norm	SN1	0.420	0.039	0.896	0.855	0.912	0.776
	SN2	0.345	0.037	0.895			
	SN3	0.383	0.050	0.850			
Shared identity	SID1	0.380	0.029	0.870	0.856	0.914	0.779
	SID2	0.378	0.024	0.915			
	SID3	0.373	0.027	0.863			
Social interaction	SIT1	0.348	0.035	0.842	0.829	0.898	0.746
	SIT2	0.390	0.024	0.894			
	SIT3	0.426	0.039	0.854			
Diversion	D1	0.237	0.064	0.764	0.731	0.836	0.564
	D2	0.300	0.067	0.741			
	D3	0.290	0.056	0.832			
	D4	0.484	0.085	0.844			
Actual playing behavior	APB1	0.426	0.040	0.872	0.767	0.869	0.692
	APB2	0.302	0.069	0.707			
	APB3	0.462	0.041	0.903			

Note: [a]All factor loadings were significant at $p < 0.001$

Table II.
Psychometric properties of constructs

Convergent validity was assessed using average variance extracted (AVE) and factor analysis. In our study, all AVEs were above the required value of 0.5 (Chin, 1998), as shown in Table II. We conduct the exploratory factor analysis using SPSS. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.880, which was well above the recommended value of 0.5, and eight factors were extracted. All item loadings on stipulated constructs were greater than 0.5. All eigenvalues were greater than one as required. Each item accounted for less than 11.203 percent of the total variance, and all 25 items accounted for 78.286 percent of the total variance (see Table III).

Discriminant validity of the factors was evaluated through comparing the square root of AVEs and construct correlations as suggested by Fornell and Larcker (1981). Results indicated that all the square root of AVEs (diagonal entries in Table IV) exceeded the construct correlations (none-diagonal entries), suggesting that the measures of each construct correlated more with each other than with items measuring other constructs (Fornell and Larcker, 1981). Therefore, we concluded that the discriminant validity of all scales was adequate.

As self-reported data from a single source were used, we measured the extent of common method bias using two analyses. First, a Harman's one-factor test was conducted through entering all constructs in an unrotated principal component analysis and examining the resultant variance (Harman, 1976). The results indicated

| Construct items | Components | | | | | | | |
	1	2	3	4	5	6	7	8
APB1	0.202	0.142	0.159	0.107	0.116	0.076	*0.805*	−0.064
APB2	−0.006	0.080	−0.056	0.153	0.040	0.046	*0.738*	0.231
APB3	0.186	0.221	0.204	−0.021	0.060	0.095	*0.803*	0.066
PE1	0.164	0.164	*0.849*	0.121	0.170	0.102	0.115	0.020
PE2	0.164	0.252	*0.805*	0.130	0.128	0.166	0.074	0.250
PE3	0.149	0.126	*0.702*	0.156	0.300	0.145	0.170	0.284
SN1	0.151	0.064	0.149	*0.802*	0.145	0.095	0.177	0.199
SN2	0.153	0.063	0.034	*0.861*	0.096	0.055	0.106	0.221
SN3	0.175	0.197	0.175	*0.770*	0.240	0.092	−0.010	0.001
PCM1	*0.830*	0.164	0.183	0.170	0.164	0.008	0.128	0.145
PCM2	*0.891*	0.122	0.127	0.144	0.123	0.074	0.086	0.098
PCM3	*0.847*	0.030	0.103	0.161	0.126	0.111	0.165	0.107
SID1	0.276	0.352	0.199	0.105	*0.711*	0.048	0.066	0.159
SID2	0.180	0.194	0.174	0.180	*0.776*	0.126	0.209	0.206
SID3	0.107	0.026	0.240	0.315	*0.752*	0.189	0.023	0.191
SIT1	0.250	0.299	0.100	0.226	0.118	0.070	0.225	*0.685*
SIT2	0.218	0.211	0.165	0.251	0.230	0.065	0.137	*0.731*
SIT3	0.008	0.192	0.277	0.137	0.360	0.227	−0.012	*0.621*
D1	−0.062	0.173	0.028	0.092	0.058	*0.729*	0.160	0.107
D2	0.273	−0.089	0.097	−0.020	0.077	*0.676*	−0.006	0.336
D3	0.039	0.288	0.143	0.123	0.097	*0.763*	0.036	−0.023
D4	0.121	0.337	0.413	0.068	0.211	*0.570*	0.050	−0.157
IP1	0.160	*0.782*	0.223	0.200	0.121	0.235	0.207	0.171
IP2	0.051	*0.795*	0.216	0.088	0.186	0.201	0.139	0.250
IP3	0.141	*0.824*	0.144	0.088	0.169	0.184	0.227	0.161
Eigenvalue	2.801	2.761	2.607	2.503	2.310	2.254	2.240	2.097
Variance extracted	11.203	11.042	10.427	10.011	9.239	9.015	8.961	8.386
Cumulative variance (%)	11.203	22.245	32.673	42.684	51.923	60.938	69.899	78.286

Table III.
Factor analysis
results

	IP	PE	PCM	SN	SID	SIT	D	APB
IP	*0.935*							
PE	0.548	*0.903*						
PCM	0.364	0.435	*0.923*					
SN	0.391	0.418	0.424	*0.881*				
SID	0.533	0.593	0.470	0.519	*0.883*			
SIT	0.563	0.548	0.442	0.508	0.617	*0.864*		
D	0.540	0.503	0.305	0.301	0.439	0.410	*0.751*	
APB	0.462	0.370	0.369	0.287	0.331	0.358	0.285	*0.832*

Table IV.
Square root of the
AVE vs correlation

Note: The diagonal terms indicate the square root of AVE for each construct, and the off-diagonal terms show the correlations

that eight factors were present and the variance explained by the most significant factor was only 11.2 percent. Second, a new measurement model with all indicators loading on a common method factor was constructed and compared with the original measurement, following the procedure used by Liang *et al.* (2007). The results indicated that the principal variable loading were all significant at the 0.001 level, while the common method factor loadings were not significant. Thus we concluded that common method bias was unlikely a problem in our data set.

4.2 Structure model

The analysis results of the structural equation model are presented in Figure 4. Seven of the nine paths in the research model are supported. The results show that the model accounts for 45.8, 34.0, and 27.3 percent of the variances in perceived enjoyment, intention to play, and actual playing behavior, respectively. None of the three control variables (age, gender, and identity) has a significant impact on the dependent variable,
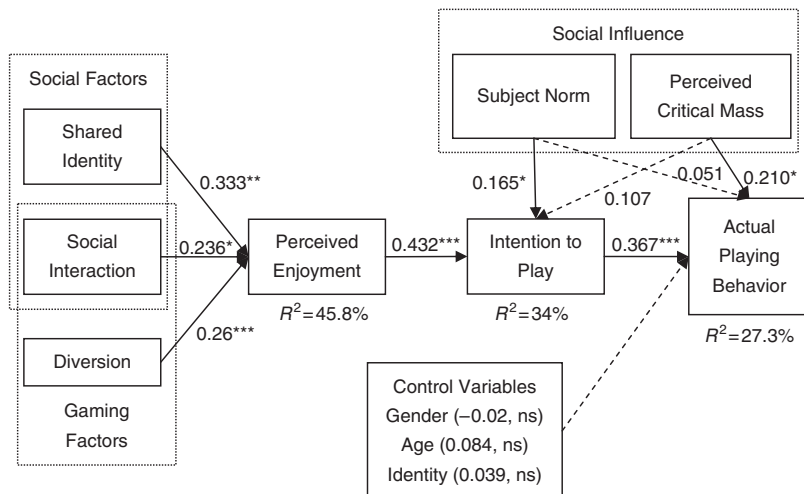
Figure 4.
Structural model
testing results

Notes: *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$, (two-tailed); insignificant ($p > 0.05$) paths are depicted in dashed lines

eliminating the confounding effects of these control variables on users' actual social game-playing behaviors.

The results show that all three factors based on characteristic of social games play significant roles in enhancing perceived enjoyment of social games. In particular, shared identity ($b = 0.333$, $p < 0.01$), social interaction ($b = 0.236$, $p < 0.05$), and diversion ($b = 0.26$, $p < 0.001$) have positive effects on perceived enjoyment, supporting *H1*, *H2*, and *H3*, respectively. Further, perceived enjoyment significantly influences users' intention to play ($b = 0.432$, $p < 0.001$) and intention to play significantly influences users' actual playing behavior ($b = 0.367$, $p < 0.001$), thus *H4* and *H9* are supported. Finally, both subject norm and perceived critical mass have asymmetric influences on users' intention to play and the actual playing behavior. The results show that subject norm has a significant and positive influence on the intention to play ($b = 0.165$, $p < 0.05$), while perceived critical mass has no significant influence on the intention to play ($b = 0.107$, ns). Thus, *H5* is supported, but *H6* is not. Perceived critical mass has a significant and positive influence on the actual playing behavior ($b = 0.210$, $p < 0.05$), while subject norm has no significant influence on the actual playing behavior ($b = 0.051$, ns). Thus, *H8* is supported and *H7* is not supported.

5. Discussion

5.1 Discussions of the results

The objectives of this study are to explore what social and gaming factors determine users' perceived enjoyment and examine the effects of perceived enjoyment and social influence on users' intention to play and actual playing behaviors of social games. We sought to achieve these objectives by inferring the characteristic of social games, and by developing a theoretical model. The analyses indicate that all constructs' psychometric properties exceeded the established criteria for instrument reliability, convergent validity, and discriminant validity. The structural model demonstrated there are causal relationships among factors in the model we tested. The results supported seven of nine hypotheses.

Our results provide evidence that shared identity, social interaction, and diversion play an important role in enhancing users' perceived enjoyment. First, shared identity is a social factor derived from the real-identity feature of social games. The results indicate that being able to play within existing networks makes a social game more interesting. Second, social interaction is both a social factor and a gaming factor. Embedded in social platforms, players want to interact with friends and to keep up social connections through social games. This social reason for playing games is intriguing. From the gaming perspective, social interaction is considered one of the most important aspects of the optimal experience with computer games (Chang, 2012). Third, diversion is a gaming factor derived from the casual feature of social games. Social games are used to relax, escape from stress, and avoid responsibilities. Prior research has demonstrated that the designed structures of social games make them cheerful and easygoing places (Hou, 2011; Chen *et al.*, 2012). Thus, the casual characteristic makes social games more enjoyable.

Further, as we expected, perceived enjoyment has a significant influence on user's intention to play, which is consistent with numerous prior studies (Van der Heijden, 2003; Lee and Tsai, 2010; Han and Windsor, 2011). However, to our surprise, subject norm, and perceived critical mass have asymmetric influence on users' intention to play and the actual playing behavior. Subject norm only significantly influences users' intention to play, while perceived critical mass only significantly influences

users' actual playing behavior. For the former, one plausible explanation is that social bonds in social games can lead to the feeling that users ought to behave according to a specified pattern, rather than the actual behavior. Considering the openness of the internet, users can behave freely in any pattern they want to. Although the subject norm derived from relationships in social games may bind users' behavior intentions, the actual playing behavior seems to go beyond interpersonal relationships (Cater and Zabkar, 2009). For perceived critical mass, one plausible explanation is that users may participate in social games unconsciously if most people around them are doing so. Social games are casual, easy to pick up, "masterable" to a vast, formerly "nongamer" audience, and they require fewer mental resources to process gaming tasks (Hou, 2011). Players who observe or hear about others around them playing social games usually join this activity, but this observation or hearing does not make them realize that they have an urgent desire toward social games. Another explanation is that users would make various investments on his or her registered social game, which include time, privacy information, relational capital, reputation capital, and various other resources. These investments constitute sunk costs, which will diminish or be lost if the user fails to actually play this game. Even though they do not want to do so, they feel they need to do so (Meyer and Herscovitch, 2001). This results verify the declining importance of social influence with time as noticed in the literature (Lu, 2014).

5.2 Theoretical contributions

The major contribution of this research is the development of a theoretical model explaining users' perceived enjoyment, intention to play, and actual playing behavior in the distinctive context of social games. In particular, this study makes three main contributions to research. First, through analyzing characteristics of social games, we emphasize the difference between social games and other online games or computer games. Being embedded in social platforms makes the dynamics of player interaction in social games unique from other online games. In the real-identity context, playing with people in their existing friendship networks such as friends, family, and co-workers (Lee and Wohn, 2012) distinguishes social games from MMOGs, which are mostly played with online friends outside of the players' offline networks. Being casual in game features makes a social game easy to pick up as opposed to an intense and complex hardcore game. These distinctions should be considered in future research related to social games.

Second, recognizing the enhancing role of social and gaming factors on perceived enjoyment, this study contributes to a deeper understanding of the critical factors that promote the hedonic value of social games. Derived from the characteristics of social games, social interaction, shared identity, and diversion are found to be important drivers of the enjoyment of social games. While prior studies have already investigated the antecedents of perceived enjoyment in other online services (Van der Heijden, 2003; Lee and Tsai, 2010; Shin, 2010; Han and Windsor, 2011), we advanced this knowledge base by examining factors that enhance perceived enjoyment in social games. Our approach of considering both social and gaming factors provides a useful framework for future investigations of specific entertainment-oriented technology based on social platforms.

Third, our empirical test finds different roles that subject norm and perceived critical mass have in determining the intention to play and the actual playing behavior. From social psychological and economic perspectives, social norms, and critical mass are two distinctive types of social influence. Prior research has found that social factors profoundly impact users' behavior and behavior intention (Hsu and Lu, 2004).

However, their relationships with actual behaviors and behavior intention have not been adequately investigated. This study suggests that researchers should emphasize subject norm when investigating users' intention and emphasize perceived critical mass when investigating users' actual behavior in future research.

5.3 Practical implications

The results of our study provide social game practitioners with a set of insights into how to improve users' intention to play and actual playing behavior. Being free to play, social games have to enhance their perceived enjoyment to attract a large number of players to support their revenue models. Residing on social networking platforms, social games may have the capacity to serve as a unique venue for socialization in a playful manner. Apart from practice implication in earlier literature, this study indicates both gaming and social factors can predict users' behavior in social game.

First, it would be a good strategy to facilitate social interactions in social games. While the underlying structure of social games encourages social interactions in general, users do not passively accept what the technology affords but actively appropriate technology to accomplish their own goals. It is likely that users who relish the social values of game actions and desire to enhance their social standing in the game tend to experience more enjoyment. Social game developers can design more channels to fulfill users' need of helping as many friends as they can in the game, or design more specific gifts for users to choose for particular friends. Second, shared identity means users can play with their existing networks, which enhances the enjoyment of social games. Managers should strengthen their cooperation with social platforms and embed social games as deeper as possible. Developing their own social platforms can be an effective strategy. For instance, game maker Zynga runs its own social network on Zynga.com that connects users of its games via all devices and platforms, including longtime partner Facebook. Finally, diversion makes users feel relaxed, escape from stress, and avoid responsibilities, which enhances the enjoyment of social games. Casual game design commonly features excessive positive feedback for every successful action the player performs (Hou, 2011). Developers should design social games to be cheerful and easy to play. For instance, small rewards can be given out during the game so that progress can be made quickly and is visible to players.

In addition, to attract more participants' attention, our study advises managers to focus on enhancing users' perceived enjoyment, because perceived enjoyment plays the most important role in determining users' behavior intention (Van der Heijden, 2003; Han and Windsor, 2011). Second, the asymmetric influences of subject norm and perceived critical mass on intention to play and actual playing behavior is particularly important for managers when they decide how to allocate resources to operate a social game. On one hand, managers should provoke individuals' intention through developing some opinion leaders. Recommendations from opinion leaders can arouse more potential users' desire for this social game. On the other hand, through word-of-mouth communication or mass advertisements, managers can accelerate network effects to achieve a perception of critical mass (Hsu and Lu, 2004). The more users in a social game, the more user-generated experience it is likely to exchange and thus the more users will play it.

5.4 Limitation and future research

Notwithstanding the above-mentioned contributions, our study is subject to several limitations. First, as with most empirical studies, the spectrum of respondents presents

some limitations to generalization. Our empirical study was conducted in a single social platform in China, whose internet policy and online environment differ from those of other regions in the world. Therefore caution should be exercised when generalizing the findings to other national and cultural settings. Future research can investigate users' playing behavior and perceived enjoyment of social games in other social platforms and in other regions. However, nicknamed the "Facebook of China," Renren is considered to be the Chinese equivalent of Facebook in terms of interface design and business model. This study indeed represents a large portion of social game users and provides representative results for future research. The sample size is small, although it is sufficient for PLS analyses. Future research can test the research model using larger sample size.

Second, all the constructs in our research model were studied retrospectively using self-response scales, which might have left room for some recall bias. Nevertheless, we set many screening criteria to make sure our data reflected users' actual behaviors and perceptions. It would be useful for future research to measure users' perception and experiences through observing their actual behaviors in social games.

Third, the research model is not comprehensive, as it does not consider external factors for reasons of parsimony (e.g. different types of social games, different social platforms, and users' behavior patterns). Wide differences in services across different social games may exist, and user expectation and experiences may differ accordingly. Some other factors presented in previous literature in the context of general online games or computer games (e.g. habit, flow experience, network externality) may significantly influence users' behaviors in social games. However, the main contribution of this study lies in identifying social and gaming factors in enhancing users' perceived enjoyment and social influence in impacting users' intention and actual behavior in the specific context of social game. Future research can explore more factors driving users' perceived enjoyment and actual behaviors in social games.

In addition to addressing the limitations of this study, future research may also investigate the outcomes of various playing behaviors of social games. For example, it would be interesting to examine the relationship between social game-playing behaviors and human well-being. And investigating the relationships between users' satisfaction with the specific design features and continuance behavior or paying behavior in social games would be useful for social game providers.

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(The Appendix follows overleaf.)

Appendix

Subject norm (Lee and Tsai, 2010)
SN1   People who influence my behavior would think I should play social games
SN2   People who are important to me would think that I should play social games
SN3   My friends think that I should play social games

Perceived critical mass (Hsu and Lu, 2004)
PCM1 Most people in my group play social games
PCM2 Most people in my community play social games
PCM3 Most people in my class/office play social games

Perceived enjoyment (Lee and Tsai, 2010)
PE1   The process of playing social games is enjoyable
PE2   While playing social games, I experienced pleasure
PE3   Overall, I believe that social games are playful

Social interaction (Lucas and Sherry, 2004; Lee and Tsai, 2010)
SIT1 Often, a group of friends and I will play social games together
SIT2 My friends and I use these social games as a channel to get connected
SIT3 Communicating with others makes social games more enjoyable

Diversion (Lucas and Sherry, 2004; Hou, 2011)
D1   I will forget some of the real-life problems I have
D2   I will play social games when I have other things to do
D3   I will vent and relieve stress from the day
D4   I will feel relaxed

Shared identity (Lucas and Sherry, 2004; Hou, 2011)
SID1 I will join events or activities of my friends
SID2 I belong to the group
SID3 I will decrease the likelihood of being left out

Intention to play (Davis, 1989)
IP1   I intend to play social games in the future
IP2   I intend to play social games as much as possible
IP3   I think I will frequently play social games in the future

Actual playing behavior (Hou, 2011)
APB1 How often do you play social games?
      1 – Never. 2 – Several times a week. 3 – Once a week. 4 – Two or three times a week. 5 – Four to
      six times a week. 6 – Once a day. 7 – Several times a day
APB2 How long do you participate in social games a week?
      1 – Less than one hour. 2 – 1-5 hours. 3 – 6-10 hours. 4 – 11-15 hours. 5 – 16-20 hours. 6 – 21-25
      hours. 7 – More than 25 hours
APB3 Please rate your frequency of playing social games, using a 7-point scale ranging from 1 (never)
      to 7 (very frequently)

Table AI.
Measures used
in this study

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