



## The impact of perceived risk, intangibility and consumer characteristics on online game playing

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### ABSTRACT

Online game is the most popular entertainment application in the virtual world and online gamers demonstrate high attachment to playing online games. Previous studies have linked to the numerous negative outcomes in playing online games. The factors contribute to the negative consequences on using online game have been relatively neglected. The purpose of this study is to explore the impact of perceived risk, intangibility, gender and age (adolescent/adult) difference on online game playing consequences and intentions. Past usage frequency is also made to look into the influence additional purchase intention. A total of 1418 useful questionnaires (including 1018 from public interview and 400 from online questionnaire feedback) were collected for final data analysis. The results demonstrated the important roles that time risk, psychological risk, financial risk, physical intangibility, mental intangibility and generality play on the negative consequences associated with online game playing. The results also indicated that male and adolescent individuals spent much more time on online game and intended to act the entertainment more than females and adults did. Finally, past online game playing frequency was showed to be a positive predictor of future online game playing intention.

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### 1. Introduction

Online game, playing the pioneering role in bringing synthetic worlds out of the subculture of computer (Arakji & Lang, 2008), is the most popular entertainment application in the virtual world and online gamers demonstrate high attachment to playing online games (Lu & Wang, 2008). According to the Institute for Information Industry, online computer gaming in Taiwan accounts for 40% of all internet use which is about over three million people. In Taiwan, over 450,000 users play online games during peak hours and the circumstance grows at a rapid pace, denoting that online gaming is the most popular pastime (Chen, Wang, & Lee, 2009; Wang, Chen, Lin, & Wang, 2008). Nevertheless, playing online games has been linked to numerous negative outcomes (Brian & Wiemer-Hastings, 2005; Chuang, 2006; Cole & Griffiths, 2007; Liu & Peng, 2009). Kim and Kim (2010) reveal problematic online game use (risk) as an increasing investment of resources to online game-related activities, feelings of euphoria when playing online games, an increasing health problem of the effects of playing online games, conflict and failure of self-control of problematic behavior, and preference of virtual relationship over face-to-face relationships with others. This seemingly contradictory result de-

serves further empirical cross examination. However, online game researchers have so far paid insufficient attention to the factors that causes adverse impact on using online games.

Risk perception and intangibility are two main factors that cause adverse impact on using online games. The risk perception (see, for examples, Aldás-Manzano, Lassala-Navarré, Ruiz-Mafé, & Sanz-Blas, 2009; Dowling & Staelin, 1994; Johnson, Sivadas, & Garbarino, 2008; Kwun & Oh, 2004; Link & Marxt, 2004) and intangibility perception (see, for examples, Bebko, 2000; Grove, Carlson, & Dorsch, 2002; Laroche, Bergeron, & Goutaland, 2001) have been proved valuable in various areas on the behavioral intention. The current research also attempts to extend and validate these attributes in the online game playing consequences and intentions because online game playing is processing in an intangible environment with many problematic use (Kim & Kim, 2010). In addition, past research confirmed the different intentions and consequences for playing online games between adolescent and adult online game players (Griffiths, Davies, & Chappell, 2004; Yee, 2006) and it also seems to be a phenomenon across genders (Chou & Tsai, 2007). In such a case, the difference between adolescents and adults, male and female behaviors deserves further empirical inspection. Past usage frequency seems to influence additional purchase intention (Gupta & Kim, 2007). Thus, online game playing frequency would have significant influence on online game future playing intention. In this study, an effort was therefore made to look into the above issues.

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## 2. Literature review and research hypotheses

### 2.1. Perceived risk and online game playing

The concept of perceived risk was first introduced by Bauer (1960) and perceived risk is the degree to which the consumer feels the uncertainty and consequences associated with their actions and play a critical role in consumer decision-making (Hunter-Jones, Jeffs, & Smith, 2007; Kwun & Oh, 2004; Liao, Lin, & Liu, 2010; Pavlou, 2003; Stone & Grønhaug, 1993). Bauer (1960) emphasizes that he is concerned only with perceived risk (subjective risk) and not actual risk (objective risk). Perceived risk appears when an individual is involved in situations where the outcomes are uncertain and is worried about the consequences of an unsuitable decision (Fraedrich & Ferrell, 1992; Liao et al., 2010). The extant literature has treated risk perception as a multi-dimensional construct, that is, social, time, financial, physical, performance and psychological risks (e.g., Forsythe, Liu, Shannon, & Gardner, 2006; Liebermann & Stashevsky, 2002; Stone & Grønhaug, 1993). Academicians have also identified the prevalent types of perceived risks in the intention behavior (Aldás-Manzano et al., 2009; Dowling & Staelin, 1994; Johnson et al., 2008; Link & Marxt, 2004).

Perceived risk theory has intuitive enchantment and plays a role in facilitating marketers to realize the world through consumer-based thought. In addition, risk analysis can be used in marketing resource allocation decisions (Mitchell, 1999). Therefore, perceived risk has gathered attention from both practitioners and academicians. Due to its importance, perceived risk has been widely employed in a variety of disciplines. Examples of perceived risk application in management include the consumers' behavior in travel and tourism (Hunter-Jones et al., 2007), online bank consumption (Aldás-Manzano et al., 2009), purchasing of perishable products in grocery store (Tsiros & Heilman, 2005), online pharmacies shopping (Buttner, Schulz, & Silberer, 2005), credit card purchase (Goyal, 2008), purchasing of food (Yeung & Morris, 2006; Yeung, Yee, & Morris, 2010) and online store shopping (Chang & Chen, 2008).

A person's behavior involves risk if the behavior will produce consequences that he or she cannot anticipate with anything approximating certainty and some of which are likely to be undesirable (Bauer, 1960; Liao et al., 2010). Perceived risk is therefore an influential tool to explain consumers' behavior because consumers are more often forced to avoid mistakes than to maximize efficacy in purchasing (Mitchell, 1999). Previous studies have also revealed that perceived risk negatively influenced willingness to act a risky behavior (Keil et al., 2000; Nicolaou & McKnight, 2006). Compared to traditional environments, the risk related to probable cost from the online transaction is higher (Aldás-Manzano et al., 2009; Mukherjee & Nath, 2003; Wang, Wang, Lin, & Tang, 2003). The higher levels of perceived risk that consumers encounter through the internet highlight it as an important factor that influences online activity intention. Perceived uncertainty and monetary cost were found to induce consumers' risk perception of online behavioral intention (Aldás-Manzano et al., 2009; Buttner et al., 2005; Chang & Chen, 2008; Miyazaki & Fernandez, 2001; Noort, Kerkhof, & Fennis, 2008; Shen & Chiou, 2010; Walter, Gupta, & Su, 2006). Moreover, online transactions risk perception diminishes perceived behavioral and environmental control, and negatively influences online usage intentions (Pavlou, 2003). Online game playing is one type of online usage. Therefore, lower usage intention will affect online game players when they make decisions under situations characterized by uncertainty, discomfort or concern about other individuals' possible bad feedback (social risk), time wastage (time risk), high fees (financial risk), harmfulness (physical risk), slow connection and operation (performance risk), and bruise of the self-image or self-concept (psychological risk). Thus, based on the foregoing discussion H1 is proposed as follows:

**H1.** Perceived risk is negatively related to online game playing consequences and intentions.

### 2.2. Intangibility and online game playing

The Oxford Dictionary of Current English (1996) defines intangibility as something that cannot be touched or seen, precisely measured or clarified and grasped mentally. Moreover, intangibility is one of the distinguishing characteristics of service according to Santos (2002) and Shostack (1977) and refers to the total lack of perceptions of the service's variability, inseparability and perishability before it is performed (Bebko, 2000; Eggert, 2006). The adoption of delivering services through the internet represents a complex intangible service delivery (Aldás-Manzano et al., 2009). Online game service, geek into the mainstream internet-based business domain (Arakji & Lang, 2008), confronts the intangibility characteristic as well and therefore plays a role in determining its playing intention.

In a recent article, Laroche et al. (2001) suggested that the construct "intangibility" consisted of three dimensions, that is, physical intangibility, mental intangibility and generality. Physical intangibility is the lack of physical evidence or "impalpable" and "not corporeal" (Shostack, 1977). Mental intangibility reflects the lack of clear, mentally tangible representation of a particular good or service, which decreases as experience and familiarity with the evaluated service increases (Eggert, 2006). Generality refers to the consumer's difficulty in precisely describing or defining a particular item or service (Laroche, McDougall, Bergeron, & Yang, 2004). Transactions characterized as intangible could result in people's reluctance to engage in any form of online transaction (Beldad, de Jong, & Steehouder, 2010). Since the quantity of and quality of information available diminish with intangibility in online game environment, online game players' expectations for the performance of this service will be low. Therefore, three-dimensional intangibility will negatively impact on online game playing service. Specifically, the following hypotheses are therefore proposed:

**H2a.** Physical intangibility is negatively related to online game playing consequences and intentions.

**H2b.** Mental intangibility is negatively related to online game playing consequences and intentions.

**H2c.** Generality is negatively related to online game playing consequences and intentions.

### 2.3. Gender and adolescent/adult issues have impact in online game playing

Previous empirical studies found out that females were more likely to be computer phobic than males (Igbaria & Chakrabarti, 1990; Rosen & Maguire, 1990), therefore, males have more positive attitudes towards computers than females (Schumacher & Morahan-Martin, 2001). Subsequently, this seem to explain why females have lower internet frequency usage than their male counterparts, notwithstanding that there has been a remarkable increase in usage by females in the last few years (Schumacher & Morahan-Martin, 2001). On the functional use of internet, evidence based on gender indicates that females recognized internet as a tool or technology, while males viewed internet as a source of enjoyment or toy (Colley & Maltby, 2008; Tsai & Lin, 2004). Therefore as a consequence, men are more likely to use game web sites

than their female counterparts (Joiner et al., 2005; Weiser, 2000). Performing better than females at tasks requiring visual–spatial skills, makes males feel more successful and enthusiastic about playing online games (Chou & Tsai, 2007; Mitchell, 1985). Further, reported evidence show that males spent more time and enjoy online games over a sustained time, while females have less free time to play time-intensive online games (Cohen, 2009; Sayer, 2005) since they spend more time occupied with other activities. Chou and Tsai (2007) have also confirmed that the male play more online game than their female counterparts.

Griffiths et al. (2004) suggested adolescents tended to sacrifice much time playing online games and it is one of their most popular online activities. However, more and more adults have begun to participate in online game, and adolescents are no longer the predominant population of online game players (Lu & Wang, 2008; Wood, Griffiths, Chappell, & Davies, 2004). Although Lu and Wang (2008) expressed that more adults participated in online game recently, most adults required more working time or taking care of children and therefore have less free time than adolescents who play online game. Empirical evidence revealing the difference between the youths and adults behavior on online playing indicate that the youths get higher frequency on the activity (e.g., McClure & Mears, 1984). Therefore, based on the preceding discussion the following Hypotheses 3 and 4 are proposed:

**H3.** Males play more frequently online games and have higher playing intention than their females counterparts.

**H4.** Adolescents play more frequently online games and have higher playing intention than the adults.

#### 2.4. Online game playing frequency and online game playing intention

Venkatesh, Speier, and Morris (2002) found out that previous usage determined continued usage. Frequency of past behavior has been shown to influence additional variance in purchase intention (Gupta & Kim, 2007). Ajzen (2001) also showed behavior frequency influences future purchase intention, indicating that intentions might become largely irrelevant when a behavior has been performed many times. In the current research, online game playing frequency plays a role similar to that of behavior performance in predicting intentions. Thus, it is hypothesized that:

**H5.** Online game playing frequency is positively related to future online game playing intention.

### 3. Methods

#### 3.1. Research instruments

Prior construct measures from perceived risk (i.e., Stone & Grønhaug, 1993) and intangibility (i.e., Laroche et al., 2001) were collected and subsequently formed the basis of the original online game playing attitude scale items. The abovementioned scales were viewed usable and applicable since they have been frequently applied in a number of recent academics works. However, necessary modifications were done to befit the current research.

The perceived risk was adapted from Stone and Grønhaug's (1993) six sub-measurements: social, time, financial, physical, performance and psychological risks. Each sub-measurement includes three items to measure its specific risk separately. This research selected the 18-item measures which have been extensively validated by prior studies (Laroche et al., 2004) and was modified to adequately reflect a measurement standard so as to determine the

computer gaming risk perception. The intangibility (including physical intangibility, mental intangibility and generality) was measured using Laroche et al.'s (2001) scales. Three items were employed to measure each intangibility dimension. This scale demonstrated strong reliability and validity, which was modified to adequately provide a measurement standard for determining computer gaming intangibility. A seven-point Likert-scale in each case was used where 1 denoted strongly disagree and 7 strongly agree.

#### 3.2. Questionnaire design and pre-testing

A draft questionnaire was designed based on the above scales to examine the respondents' perceptions of online game intangibility and risk perception. The multi-item questionnaire was used as the data collection instrument and two levels of intangibility and perceived risk of computer gaming were specified.

Before distributing the questionnaires, the questionnaire was pre-tested among 30 online gaming users in Taipei, Taiwan. The online gaming users were requested to complete the questionnaire and to provide any comments or feedback about the questionnaire statements to guarantee the face validity of the instrument, readability and logical arrangement of the questions perceived by the research population. Clarification and modification based on their suggestions followed. During the pre-test of the questionnaire, participants suggested removing two of the intangibility scale items (one from physical intangibility and the other from mental intangibility) and also another one from physical risk items so as to avoid confusion due to redundancy. The questionnaire was then modified by deleting the ambiguous aspects and as a result it strengthened the clarity and completeness of the questionnaire after all noted comments were incorporated.

#### 3.3. Subjects and distribution process

This research used two ways to collect the data, street survey interview and online questionnaire feedback. For a street survey interview, this study gathered research participants in the biggest metropolitan area, Taipei City in Taiwan. Taipei City provided the potential to access Taiwanese perception with many immigrants from other parts of Taiwan. Thus, the people in Taipei were considered qualified research subjects and therefore were chosen to represent the target population in the current research. In the public interview, people were solicited for their willingness to participate in the survey. The questionnaires were answered by the participants and collected by the researcher. Interviewers stood nearby to answer any questions when the participants had queries. Participants were required to read the questionnaire instructions carefully before completing them and confirmed that they understood what online game was. A total of 1418 useful questionnaires (including 1018 from public interview and 400 from online questionnaire feedback) were collected for final data analysis. Most respondents in the sample were male, adults, and single. The majority were jobholder and spent 1–2 times/month playing online games. In order to investigate the difference from adolescences and adult, this research separate the age between 13 and 18 as adolescence and merge the age greater than or equal to 19 as adult level. Detailed descriptive statistics relating to the respondents' profiles are shown in Table 1.

### 4. Results

#### 4.1. Accuracy of the information

A CFA on the 24 items was conducted to validate the internal and external consistencies among the three dimensions of intangibility and the six dimensions of perceived risk structure. The CFA

**Table 1**  
Descriptive statistics of the participants' profiles.

	Freq.	%		Freq.	%
<i>Gender</i>			<i>Occupation</i>		
Male	822	58	Non-student (jobholder)	913	64.4
Female	596	42	Students	505	35.6
<i>Age</i>			<i>Monthly playing frequency</i>		
13–18	159	11.2	Non-user	275	19.4
19–25	617	43.5	1–2 times	320	22.6
26–35	390	27.5	3–5 times	240	16.9
36–45	194	13.7	6–10 times	201	14.2
46–55	43	3.0	11–20 times	153	10.8
≥56	15	1.1	≥21 times	229	16.1
<i>Marriage</i>					
Married	285	20.1			
Unmarried	1081	76.2			
Divorce or	52	3.7			

Note: TWD 1 = USD 0.03.

model was computed with the LISREL statistics software package. All the goodness-of-fit values were acceptable (CFI = 0.98, GFI = 0.95, AGFI = 0.94, NFI = 0.97, IFI = 0.98, RMSEA = 0.04). Thus, the fit of the model is good. The structure was confirmed, and then related reliability and validity were assessed. Coefficient alpha values and composite reliability (CR) indexes of the dimensions were computed for internal consistency reliability tests. All the alpha and CR values, ranging from a low of 0.77 for the physical risk to a high of 0.86 for generality (see Table 2), exceeded the minimum threshold of 0.6. Thus, the results provided evidence of reliability. As for the test of validity, the evidence of convergent validity was assessed by the significant loading of each scale item to its latent dimension and Table 2 showed significant *t*-values, ranging from 24.41 to 37.31. Discriminant validity was evidenced by (a) the correlation estimate of each pair of any two dimensions less than 1.0, (b) acceptable CFA model fit and (c) AVE values higher than squared correlations between each of the latent dimensions. As observed from the above and provided in Tables 2 and 3, all discriminant validity indicators fell within acceptable ranges. Thus, it was confidently concluded that the analysis results provided supports for convergent and discriminant validity.

4.2. Hypotheses testing

Hypotheses H1–H4 were tested with Ordinary Least Squares (OLS) regression analysis (Table 4). For the regression explaining playing frequency of online game was added as a dependent variable to account for the variance along with perceived risk, intangibility, and demographic background variables of gender, and adolescent/adult. The overall regression model explaining playing frequency (model 4) was statistically significant ( $p < .001$ ) with an  $R^2$  of .202. An examination of the Variance Inflation Factors (VIF) statistics found that multicollinearity was not an issue for the independent or the dependent variables in any regression (Hair, Anderson, Tatham, & Black, 1998).

The unstandardized coefficients were used to test the hypotheses. Table 4 suggested that the time risk was negatively related to the frequency of playing online game ( $\beta = -0.666, p < .001$ ). Furthermore, the results suggested that psychological risk had also negative and significant impact on the frequency to play online game (respectively,  $\beta = -0.71, p < .001$ ). This result substantiated H1. Social risk was found to have a positive and significant relationship with playing frequency ( $\beta = 0.416, p = .018$ ), thus does not completely supporting H1 which suggest that social risk was negatively related to online game playing frequency. Financial, physical and performance risks were found not to have a signifi-

**Table 2**  
Measurement accuracy analysis statistics.

Core constructs	Factor loading	<i>t</i> -value	$\alpha$	CR value	AVE
Physical intangibility	0.73***	25.40	0.82	0.84	0.73
	0.95***	31.36			
Mental intangibility	0.83***	25.47	0.79	0.79	0.65
	0.78***	24.41			
Generality	0.81***	34.45	0.85	0.86	0.68
	0.79***	33.45			
	0.94***	36.13			
Social risk	0.85***	34.75	0.78	0.80	0.58
	0.84***	34.35			
	0.54***	20.32			
Time risk	0.80***	33.55	0.81	0.82	0.61
	0.86***	37.31			
	0.67***	26.64			
Financial risk	0.71***	28.14	0.80	0.80	0.58
	0.83***	34.56			
	0.73***	29.37			
Physical risk	0.77***	27.53	0.77	0.77	0.63
	0.81***	28.81			
Performance risk	0.73***	29.03	0.78	0.79	0.55
	0.83***	33.92			
	0.66***	25.51			
Psychological risk	0.77***	32.26	0.85	0.85	0.65
	0.85***	37.04			
	0.80***	33.65			
CFA model fits	Absolute-fit measures GFI = 0.95, CFI = 0.98, RMSEA = 0.04 Incremental-fit measures AGFI = 0.94, NFI = 0.97, IFI = 0.98				

Significance levels: \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

cant relationship with playing frequency, thus get the partial acceptance for H1.

Relating to the intangibility, Table 4 results suggest that intangibility attributes play a negative significant role in online game playing frequency (consistent with H2a, H2b and H2c). H2a was substantiated ( $\beta = -0.652, p < .001$ ), therefore, indicating that physical intangibility significantly reduce the participants' frequency to play online game. Furthermore, H2b was substantiated ( $\beta = -0.313, p < .05$ ), also indicating that mental intangibility has a significant negative impact on playing frequency. Lastly, H2c was substantiated ( $\beta = -1.423, p < .001$ ); that is, generality is negatively related to the participants' frequency to play online game. For the demographic impact, the gender (male) ( $\beta = 2.447, p < .001$ ) and adolescent/adult ( $\beta = -0.936, p < .001$ ) were statistically significant, thus supporting H3 and H4. These results suggest males and adolescences spend much more time in the online game than females and adults do.

This research also performed a linear regression to test whether each construct of the model had significant additional explanatory change in the  $R^2$  since the constructs were added consecutively in blocks. The results revealed that perceived risk, tangibility and demographic variables demonstrated significant explanatory power (Table 4).

Table 5 provides the results of a logistic regression analysis using online game playing intention as the dependent variable. Tables 4 and 5 were compared with their signs and significant level, not with their coefficient levels. There were several differences found from comparing Table 4 (model 4) and Table 5 (model 4). First, of the negative significant perceived risk variables in Table 4, time risk and psychological risk remained significant in Table 5. It must be noted the significant level of psychological risk was somewhat lower than the results in Table 4. In addition, financial risk became negative and significant ( $\beta = -0.172, p < .001$ ) but social

**Table 3**  
Correlation matrix of intangibility and perceived risk.

Research constructs	1	2	3	4	5	6	7	8	9
(1) Physical intangibility	1.00								
(2) Mental intangibility	0.25	1.00							
(3) Generality	0.48	0.36	1.00						
(4) Social risk	0.15	0.17	0.12	1.00					
(5) Time risk	0.09	0.19	0.18	0.41	1.00				
(6) Financial risk	0.12	0.19	0.14	0.31	0.55	1.00			
(7) Physical risk	-0.09	0.12	0.07	0.04	0.43	0.46	1.00		
(8) Performance risk	-0.03	0.12	-0.01	0.23	0.54	0.52	0.51	1.00	
(9) Psychological risk	0.11	0.32	0.22	0.44	0.45	0.38	0.29	0.43	1.00

**Table 4**  
Result of the Ordinary Least Squares regression analysis of playing frequency.

Variables	Model 1	Model 2	Model 3	Model 4
Constant	14.077***	17.761***	21.184***	20.275***
Perceived risk				
Social risk	0.277		0.490**	0.416*
Time risk	-1.013***		-0.749***	-0.666***
Financial risk	-0.184		-0.022	-0.058
Physical risk	-0.101		-0.137	-0.135
Performance risk	0.541*		0.112	0.085
Psychological risk	-1.028***		-0.704***	-0.710***
Intangibility				
Physical intangibility		-0.627***	-0.704***	-0.652***
Mental intangibility		-0.511***	-0.298*	-0.313*
Generality		-1.748***	-1.574***	-1.423***
Demographic				
Gender				2.447***
Adolescent/adult				-0.936***
R <sup>2</sup>	.066***	.144***	.176***	.202***
ΔR <sup>2</sup> (Model 1)			.11***	.136***
ΔR <sup>2</sup> (Model 2)			.032***	.058***
ΔR <sup>2</sup> (Model 3)				.026***

Note: n = 1418.  
Significance levels: \*p < .1; \*\*p < .05; \*\*\*p < .01.

**Table 5**  
Result of the logistic regression analysis of playing intention.

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	2.024***	2.664***	3.908***	3.926***	2.652***
Perceived risk					
Social risk	0.000		0.046	0.030	-0.03
Time risk	-0.225***		-0.199***	-0.178***	-0.151**
Financial risk	-0.177***		-0.154***	-0.172***	-0.172***
Physical risk	0.016		0.008	0.001	0.022
Performance risk	0.134*		0.046	0.044	0.044
Psychological risk	-0.148***		-0.089*	-0.101*	-0.060
Intangibility					
Physical intangibility		-0.126**	-0.132***	-0.126**	-0.083*
Mental intangibility		-0.138**	-0.083*	-0.090*	-0.071
Generality		-0.387***	-0.371***	-0.343***	-0.261***
Demographic					
Gender				0.662***	0.524***
Adolescent/adult				-0.346***	-0.280***
Frequency					0.077***
Hit ratio (%)	64	67	67.8	70.2	73.4
Cox and snell R <sup>2</sup>	.06	.11	.14	.18	.22

Note: n = 1418.  
Significance levels: \*p < .1; \*\*p < .05; \*\*\*p < .01.

risk lost its positive significance in Table 5, whereas the results for other non-significant risk perception remained unchanged.

The results for the intangibility attributes were the same in Tables 4 and 5 though the significance level of physical intangibility was somewhat lower for the result in Table 5. The results for the demographic impact, the gender and adolescent/adult remained unchanged. In summary, Table 5 did not affect the conclusion

made previously. Specifically, financial risk plays a signal attribute and impact the playing intention. Overall, the above conclusions for Table 5 were almost same as those of Table 4.

Finally, this research tested whether the frequency would influence the future playing intention. Table 5 (model 5) revealed that frequency had a positively significant relationship with playing intention ( $\beta = 0.077, p < .001$ ), thus supporting H5.

## 5. Discussion

The goal of this research was to employ theory and research on online game service industry to understand the risk and intangibility factors that contribute to the negative relationship with frequency and intention of playing online game. In general, this study confirmed the important roles that time risk and psychological risk play on the negative consequences associated with online game playing frequency and intention. In addition, financial risk negatively impacted online game playing intention. However, the data fail to support the negative influence of social risk on online game playing. In a recent study, Chen et al. (2009) found a positive impact of social motivation on educational, social, and relaxation satisfaction for online gamers. In addition, Beard and Ragheb (1983) suggested people could interact with others to build and develop close friendships and then gain a feeling of belonging by participating in leisure activities. Therefore, online game is a social affiliation (Koo, 2009). Physical risk and performance risk had no effect on the online gamers revealing that the online gamers did not view this activity would hurt their physical health and that online game function was a form of relaxation, not win or loss event. There is one interesting finding, i.e., financial risk has significant negative influence on online game future playing intention but not significant on the current playing frequency. The possible reason is that the online game players could become addicted to the scenario while playing game and ignore the financial risk. Nevertheless, if they are not in the playing scenario, they will be rational and consider the financial conscientiously.

The present study further examined the impact of three-dimensional intangibility on online game playing. The present data confirmed that physical intangibility (H2a), mental intangibility (H2b) and generality (H2c) were negatively associated with online game playing frequency and intention, supporting the evidence that tangible was depended on perceived quality (Zeithaml, 1981). Moreover, the present study demonstrated that male and adolescent individuals spent much more time on online game and intended to act the entertainment more than females and adults did. Past online game playing frequency was found to be a positive predictor of future online game playing intention. Therefore, to improve the present model, further research is needed to determine the most powerful variables that may predict online game playing intention.

### 5.1. Implications

Online games market gives the great business potential. Most prior research have investigated the problematic use or negative outcome associated with playing online game (Caplan, 2002; Liu & Peng, 2009), but they did not investigate the possible factors. The effect of players' risk and intangibility perceptions are two main factors that cause adverse impact on using online games. In contrast, this research has proposed a model in which multi-dimensional risk and intangibility are posited to have a significant effect in predicting frequency/intention to play online game. In addition, this research has verified that different gender and adolescent/adult have different playing intention/frequency and playing frequency had significant impact on playing intention. These research findings have both theoretical and practical implications in the emerging industry field.

For academics, these research findings have assorted significant theoretical implications. Firstly, this research contributes to an application of risk and intangibility theory to online game industry and the findings in this research provided support for the perceived risk (Pavlou, 2003) and intangibility (Eggert, 2006; Laroche et al., 2004; Shostack, 1977) of intention on online game playing. Despite the overall perspective of risk and intangibility construct, this re-

search investigates in detail the impact of online game playing using individual intangibility and risk perception multi-dimensions separately. Secondly, this research contributes to an understanding of online game attracting different gender and adolescent/adult to play. The male and adolescence may perform better than the female and adults like figuring out game strategies sooner and getting higher game scores. The research findings provide evidence supporting the previous academic works revealing that online gamers are usually young with more leisure time than adults and male with more enthusiastic than female (e.g., Chou & Tsai, 2007; Griffiths et al., 2004; McClure & Mears, 1984; Mitchell, 1985). The evidence contributes to the understanding that virtual game can express one's sense of control when operating as expert, and in the process gain respect from others, thus, it allows the male and adolescence without self-esteem and confidence enjoy playing online games (Chou & Tsai, 2007). Thirdly, this research confirms the influence of past behavior frequency on additional variance in purchase intention (Ajzen, 2001; Gupta & Kim, 2007).

For online game practitioners, these research findings have several important managerial implications. Firstly, the findings suggest online game practitioners should pay attention on customers risk perception, such as time, financial and psychological risks. Developing some short-time, cheap game to establish players' self-concept is associated with attracting promotion. Secondly, the research findings reveal that social risk positively impacts playing frequency and that online game developer should design more cooperated game to attach the players' social requirement in the game (Griffiths et al., 2004; Koo, 2009). Thirdly, marketers should focus their attention on males and adolescents and investigate to develop their favorite game types to maintain their continuous use. In addition, online game managers should design and announce more tiny or plot savable game for females and adults to attract their interest on it. Fourthly, finding new customers cost more than maintaining customers, online game managers should establish a completed VIP system to strengthen the users' loyalty since they have higher intention than the non-users.

### 5.2. Limitations and future research

Several limitations and future research directions on the subject of the present study need to be interpreted with caution. Firstly, the participants of this research fill in the frequency and intention items at the same time. Future researchers could conduct a longitudinal study to explore the reciprocal relationship among the construct. Secondly, this research focused on the effect of risk and intangibility in online game. Future research could conduct the positive impact and cognition of online game playing from social cognitive perspective (Lin, Ko, & Wu, 2008; Liu & Peng, 2009.) Finally, failure in validation suggests the existence of research moderators and other factors such as product involvement degree should be taken into account for further research on moderating effects on the proposed conceptual model.

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