The Service Industries Journal

ISSN: 0264-2069 (Print) 1743-9507 (Online) Journal homepage: https://www.tandfonline.com/loi/fsij20

Consumer-based leisure constraint for online gaming

Lily Shui-Lien Chen

To cite this article: Lily Shui-Lien Chen (2013) Consumer-based leisure constraint for online gaming, The Service Industries Journal, 33:1, 115-132, DOI: 10.1080/02642069.2011.600443

To link to this article: https://doi.org/10.1080/02642069.2011.600443

Published online: 22 Jul 2011.

The Service Industries Journal
Vol. 33, No. 1, January 2013, 115–132

Routledge
Taylor & Francis Group

Consumer-based leisure constraint for online gaming

Lily Shui-Lien Chen*

Graduate Institute of Management Sciences, Tamkang University, No. 151, Ying-Chuan Road, Tamsui, Taipei County 25137, Taiwan

(*Received 16 March 2011; final version received 20 June 2011*)

The purpose of this study is to develop a multidimensional measure of consumer-based leisure constraint for online game play and to assess its psychometric properties. An empirical model of player constraint in online games provides the foundation to understanding and assessing how players differ from one another (such as high gamers/low gamers and high gamers/non-gamers) and how constraints on play relate to frequency of use. In the current study, an exploratory factor analysis was used to extract the common factors, and confirmatory factor analysis was used to create an empirical model of players' perception of constraint and to reveal its underlying structure. The analysis revealed six dimensions of constraint. The relationship between perception of constraint and frequency of use is also presented.

Keywords: social constraints; time constraints; financial constraints; physical constraints; performance constraints; psychological constraints

Introduction

The Internet has been the driving force behind the growth of the gaming industry. The size of the web-based game industry has an extremely high growth rate around the world. According to the Digital Future Coalition Intelligence prediction of worldwide online game revenues, online game global output value in 2006 reached US$5.2 billion and will reach US$13 billion by 2011 (DFC Intelligence, 2006), making online gaming a mainstream recreational activity. In Taiwan, playing web-based games is the major activity within the category of online entertainment and it reaches 40% of the total population (FIND, 2010). According to the China Game Industry Survey Report, the number of online game players in China in 2007 reached a record high of over 40 million, half of whom were paying online game players, and the number of online game players in China is estimated to double to approximately 84.6 million by 2011 (17173 NEWS, 2008). Therefore, online gaming is the most popular entertainment application in the virtual world, and online gamers demonstrate high attachment to playing web-based games (Chen, 2010; Lu & Wang, 2008).

It is imperative for academic research on leisure to remain contemporary, updating itself regularly on the continuous variations and new issues arising in the dynamic market. The leisure industry is more and more predominantly consumer-based (Foley, Holzman, & Wearing, 2007). As the use of broadband increases globally, consumer-based perception of the large population of online game players may hide the influence of universality. Numerous studies have demonstrated the motivations involved in choosing to play online games (Wan & Chiou, 2007; Yee, 2006). Nevertheless, playing online

*Email: tzjunltk@yahoo.com.tw

ISSN 0264-2069 print/ISSN 1743-9507 online

http://dx.doi.org/10.1080/02642069.2011.600443
http://www.tandfonline.com

games has been linked to copious negative problems as another contemporary issue (Chuang, 2006; Cole & Griffiths, 2007; Liu & Peng, 2009). For instance, about 55% of online game players reported high satisfaction and problems with online games (Kim & Kim, 2010; Lu & Wang, 2008). Notably, as far as universal problems related to online gaming are concerned, research shows that potential users would indeed consider their perceptions of risk (i.e. constraints) before participating in online games. Some scholars suggest that perceived risk appears when an individual is involved in situations in which the outcomes are uncertain or harmful, so the individual is worried about the consequences of an unsuitable decision (Fraedrich & Ferrell, 1992; Liao, Lin, & Liu, 2010) and behaving in online environment posing many challenges (Luo, Chen, Ching, & Liu, 2011). Moreover, online constraints tend to be more psychological and less physical and are imposed by cognition, habit, and learning efforts (Hofacker, 2008). The lack of physical constraints on website design, the relative costs of cognitive effort, and search time may represent real challenges to sustained online usage. It is necessary, therefore, to understand the constraint factors for online usage such as online gaming. To the best knowledge of these authors, however, there has been little research conducted that relates to constraints for online gaming. Traditional leisure constraints research is now well established as a recognizable and distinct sub-field within leisure studies (Jackson, 2005, p. 10), but previous scholars contended that serious knowledge gaps remain. In order to better understand this situation, this study attempts to extend and validate Stone and Grønhaug's (1993) risk construct by designing an empirical model of player constraints for online gaming and by providing a foundation to understand and assess how these players differ from one another.

The aforementioned perceived risk is a well-known risk perception attribute, proving valuable in various areas dealing with behavioural intention. Risk perception is also one of the most important determiners of constraint associated with online purchasing behaviour (Noort, Kerkhof, & Fennis, 2008), and it may lower perceptions among consumers of behavioural and environmental control. This perceived lack of control can negatively influence the consumers' intention to participate in e-commerce (Pavlou, 2003). Constraints are found as 'a subset of reasons for not engaging in a particular behaviour' (Jackson, 1988). A constraint on leisure will limit or inhibit an individual's ultimate participation in a leisure activity (Raymore, Godbey, & Crawford, 1994), such as online gaming. However, the underlying assumptions of the model have never been adapted empirically to the behaviours of online gamers. The need to develop both theoretically and empirically sound measurement scales to measure online game constraint constructs is of paramount importance. Nevertheless, it has been rarely discussed thus far. This research attempts to fill in the gap by developing a multidimensional measure of consumer-based constraint and assessing its psychometric properties. Here, consumer-based refers to a measurement of cognitive and behavioural constraint at the individual consumer level determined by a consumer survey. With the developed constraint scale, this research attempts to adopt the measurement scales to test the relationship between constraints and online game playing frequency to prove prediction validity and to compare the constraints between low gamers and high gamers, as well as between high gamers and non-gamers.

Literature review and research hypotheses

Constraints and online game playing

Jackson (1988) defined constraints as 'a subset of reasons for not engaging in a particular behaviour'. Starting from the original leisure constraints model put forth by Crawford and

Godbey (1987), leisure constraints have been developed over the past two decades, and these formulations were discussed from a number of perspectives and often take different views of the factors that may hinder leisure pursuits (Godbey, Crawford, & Shen, 2010; Jackson, 2005). Although 'leisure constraints research is now well-established as a recognizable and distinct sub-field within leisure studies' (Jackson, 2005, p. 10), serious knowledge gaps remain in existence. Previous scholars have argued there has been little exploration of either interpersonal constraints (i.e. social factors that affect the component of leisure participations) or intrapersonal constraints (i.e. individual psychological qualities that affect the component of leisure participations), compared with structural constraints (i.e. factors that occur after leisure participations are formed but before actual leisure participation takes place) (Walker, Jackson, & Deng, 2008). Risk perception is one important determiner of constraint associated with online purchasing behaviour (Noort et al., 2008), and it may lower perceptions among consumers of behavioural intention. It is possible there is an inherent gap when trying to obtain the completed phenomena. Therefore, perceived risk with six dimensions (Stone & Grønhaug, 1993) is a substitute constraint construct for traditional leisure constraints in this research to seize the online gaming constraints.

Bauer (1960) introduces the concept of perceived risk, and risk is the degree of uncertainty and the possibility of serious consequences. When an individual is involved in uncertain outcomes situations, he is concerned about the consequences of an unsuitable decision (Fraedrich & Ferrell, 1992; Liao et al., 2010). Perceived risks (constraints) play an important role in consumer decision-making processes (Liao et al., 2010; Pavlou, 2003; Stone & Grønhaug, 1993). Risk perception has been divided into a multidimensional construct – that is, social, time, financial, physical, performance, and psychological risks (e.g. Chen, 2010; Forsythe, Liu, Shannon, & Gardner, 2006; Stone & Grønhaug, 1993). Prior studies have also recognized the prevalent types of perceived risks (constraints) in the behaviour intention (Aldás-Manzano, Lassala-Navarré, Ruiz-Mafé, & Sanz-Blas, 2009; Johnson, Sivadas, & Garbarino, 2008; Link & Marxt, 2004). Perceived risk (constraint) has collected attention from both practitioners and academicians and has been widely involved in a variety of disciplines (Aldás-Manzano et al., 2009; Buttner, Schulz, & Silberer, 2005; Chang & Chen, 2008; Goyal, 2008; Tsiros & Heilman, 2005; Yeung & Morris, 2006; Yeung, Yee, & Morris, 2010). Although perceived constraint has been widely addressed in a variety of disciplines, online gaming is still never been discussed empirically with regard to the behaviours of online gamers. This research attempts to validate the constraint perception in online gaming to fill in the gap and predicts the playing frequency using the developed scales as well.

When consumers expect with anything approximating uncertainty and some of which are likely to be undesirable, they will involve constraints if the behaviour will generate consequences (Bauer, 1960; Chen, 2010; Liao et al., 2010). Thus, consumers are forced to avoid mistakes rather than to maximize benefits when purchasing (Mitchell, 1999). Prior studies have also suggested that perceived constraint (risk) has a negative effect on willingness to act in a particular manner with constraint (Keil et al., 2000; Nicolaou & McKnight, 2006). Online social network users such as online gamers are aware of perceived privacy risks and do try to prevent self-disclosure (Krasnova, Spiekermann, Koroleva, & Hildebrand, 2010). The important roles that the levels of perceived risk (constraint) playing on the negative consequences are associated with online game playing (Chen, 2010). Thus, this research infers *H1*.

H1: Perceived constraint has a negative effect on online game playing consequences.

Social constraint (risk) implies the constraint that playing online games will reduce the consumer's self-image or compromise the consumer's image in the eyes of internal and external peers. A customer's interpersonal relationships are the motive in which the customer is interested and reactive to other people (Swap & Rubin, 1993); this may determine a customer's level of trust and commitment to online gaming. These consumer standpoints or images can be altered using responsive cues referring to interpersonal thought. Online gamers may be afraid of the conflict problem with parents due to playing online games so often, or feeling closer to other gamers than to friends in reality and valuing these offline social relationships less (Kim & Kim, 2010; Ng & Wiemer-Hastings, 2005). Therefore, when online game players make decisions under situations characterized by uncertainty, discomfort, or concern about other individuals' possible bad feedback, they will play less frequently. Thus, this evidence supports *H1a*.

H1a: Social constraint has a negative effect on online game playing consequences.

Time constraint (risk) implies the constraint that customers will expend more time or effort in playing online games to reduce their feelings of comfort when playing online games compared with engaging in other activities. Online gamers are inclined to lack self-control, pouring significant time into playing games (Oliveira & Henderson, 2003). Online gamers often play longer than originally intended and are ambivalent, on the one hand putting effort to reduce the time but often fail when playing online games (Kim & Kim, 2010) and on the other hand when they are playing, always saying 'just a few more minutes'. When online gamers make decisions under situations characterized by discomfort or concern about possible time wastage, they will reduce the frequency of their online gaming (Chen, 2010). Accordingly, this research identifies and corroborates *H1b*:

H1b: Time constraint has a negative effect on online game playing consequences.

Financial constraint (risk) means the constraint that the actual costs may exceed the planned/budgeted costs of online game engagement. In other words, the financial constraint is the fear of the online gamers that they must pay more for the game service than originally anticipated. The constraint related to probable cost from the online transaction is higher compared with traditional physical environments (Aldás-Manzano et al., 2009). Online gamers are normally invited to purchase subscriptions, point cards, or monthly cards for participating, and even virtual currencies to increase a character's virtual property in pay-to-play online game world (Guo & Barnes, 2009). Prior studies also proved that perceived monetary cost would induce consumers' constraint perception of online behaviour (Aldás-Manzano et al., 2009; Buttner et al., 2005; Chang & Chen, 2008; Miyazaki & Fernandez, 2001; Noort et al., 2008; Shen & Chiou, 2010; Walter, Gupta, & Su, 2006). Therefore, these studies offer support for *H1c*.

H1c: Financial constraint has a negative effect on online game playing consequences.

Physical constraint (risk) relates to the safety and health of the individual. Physical constraint (risk) implies the perception that playing online games will be harmful to users. Playing online games will place individuals potentially at risk for physical pain, fatigue, reduced sleep time, and skipped meals (Liu & Peng, 2009). Kim and Kim (2010) found online gamers are prone to health problems from their overplaying, especially headaches and eyesight problems. When online gamers make decisions under situations characterized by harmfulness, they diminish the online gaming behaviours (Chen, 2010). Thus, this evidence supports *H1d*.

H1d: Physical constraint has a negative effect on online game playing consequences.

Perceived performance constraint (risk) is the possibility that there will be something wrong with the online game played (Fraedrich & Ferrell, 1992). Connection and operation are main requirements in the online game service. When online gamers make decisions under situations characterized by slow connection and dissatisfactory operation, they will decrease the frequency of their online gaming (Chen, 2010). Accordingly, this research is evidence of the validity of *H1e*.

H1e: Performance constraint has a negative effect on online game playing consequences.

Perceived psychological risk is the possibility that an individual suffers mental stress because of his or her participation in online gaming (Lim, 2003). As playing an online game is always connected with addiction, the behaviour of playing games might cause the user to experience psychological discomfort or unnecessary tension. Players are uncomfortable about allowing their private information to be attached to the game because they do not completely trust it. They can become depressed when facing the game code to charge their financial transaction (Sharp & Rowe, 2006). When online gamers make decisions under situations characterized by discomfort or concern about their self-image or self-concept, they will reduce their online gaming frequency (Chen, 2010). Therefore, this research proposes *H1f*.

H1f: Psychological constraint has a negative effect on online game playing consequences.

Constraint perceptions between low gamers and high gamers, and between high gamers and non-gamers

In order to understand the impact of previous online game experience, this research examined the literature on the construct of 'experience' within the research domain. Ccognitive dissonance theory (Cummings & Venkatesan, 1976; Festinger, 1957) suggests prior experience with a service influences changes of users' comprehensions. Such usage changes of users' comprehensions have been confirmed by Bhattacherjee and Premkumar (2004) in a longitudinal test of the use of information technology, using cognitive dissonance theory along with expectation-disconfirmation theory. According to expectation-disconfirmation theory, the disconfirmation of expectations is the discrepancy or gap between prior expectations and actual performance of products/services (Oliver, 1980), and that user experience with IT serves as an antecedent of the satisfaction/dissatisfaction response (Deng, Turner, Gehling, & Prince, 2010).

Prior research has empirically demonstrated a positive relationship between prior experience and acceptance of technology (Nelson & Cheney, 1997), prior experience as well as being a predictor of technology usage (Igbaria, Parasuraman, & Baroudi, 1996; Kettinger & Grover, 1997). In one computer usage study, researchers found that prior experience with the computer positively influences how the user perceives the computer positively and leads to an intention to use the computer (Afari, 2010). In other words, these experienced individuals might have already successfully negotiated through intra-personal (and even interpersonal) constraints and already formed a preference for the activities (Godbey et al., 2010). Therefore, based on the proceeding discussion, *H2* and *H3* are proposed.

H2: High gamers have lower constraint perception related to online game playing than low gamers.

H3: High gamers have lower constraint perception related to online game playing than non-gamers.

Methodology

Measurement

Perceived constraints (including social, time-related, financial, physical, performance-related, and psychological constraints) were measured by a modified version of Stone and Grønhaug's risk scales. Three items were employed to measure each dimension of constraint. Using a template that has been validated extensively by previous studies (Laroche, McDougall, Bergeron, & Yang, 2004; Sterm, Lamb, & MacLachian, 1977), a list of 18-item measures related to a player's perception of constraint was generated and was modified to adequately reflect a measurement standard in order to determine constraints associated with online gaming.

Questionnaire design, pre-testing

A draft of the questionnaire was designed based on the above scales to exam the respondents' perceptions of online game constraints. Before distributing the questionnaires, this researcher conducted a pre-test within a small sample with 30 online gamers in Taipei, Taiwan. This was done to assess the content validity of the instrument, readability, and logical arrangement of the measurement scales. The questionnaire was then modified with their suggestions incorporated.

Sample and data collection

After the inventory of items was prepared, this research comprised two waves of two completely different surveys to collect the data: a street survey/interview conducted in Taipei City and feedback from an online questionnaire. This research used two completely different surveys to collect the completed data: the online questionnaires' respondents are possible potential online game users realizing the research industry, and the face-to-face interview respondents are possible light gamers or non-gamers. The online questionnaires were collected by 104 Survey Company with a professional and completed survey database in Taiwan. Sample members who were willing to participate clicked through the URL address. The reason for conducting the public interview survey in Taipei was that Taipei is the most densely populated city of about 2,600,000 people, with many immigrants from other parts of Taiwan. Therefore, it provided the potential to assess Taiwanese perception of online gaming. Thus, the people in Taipei were considered qualified research subjects and therefore were chosen to represent the target population in the current research. This study requested people who entered the railway station and MRT and those who were surfing web sites to voluntarily participate in this 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 gaming is.

Two waves of questionnaires were delivered to respondents for their feedback. A total of 769 first-wave useful questionnaires (including 569 from the street survey/interview and 200 from the online questionnaire) and 649 second-wave useful questionnaires (including 449 from the street survey/interview and 200 from the online questionnaire) were collected for final data analysis.

Data analysis method

The data were analyzed after obtaining the survey results in order to verify the research goal. In order to identify the dimensionality of constraint items, an exploratory factor analysis (EFA) was used to extract the common factors of all 18 scale items in the first-wave data set. Then, this research employed LISREL statistical analysis software with confirmatory factor analysis (CFA) to reveal its underlying structure with the second-wave data set. Composite reliabilities (CRs) were utilized to analyze survey structure and reliability; the greater the value of CR, the higher the reliability. The validity of the researcher's dimensions and measurement items was evaluated. Convergent validity examines the agreement among multiple items measuring the same construct, with significance of factor loadings and average variance extracted (AVE) of all constructs being greater than 0.5 (Fornell & Larcker, 1981). Discriminant validity checks the degree to which measures of one construct are empirically distinct from the other constructs (Bagozzi, Yi, & Phillips, 1991) with the criterion recommended by Fornell and Larcker (1981): acceptable CFA model fit, the square roots of AVE should exceed the correlation between each of the latent constructs, and the fix significantly reduced the fit reported in the baseline CFA (Hightower, Brady, & Barker, 2002).

Results

Respondents' profiles

The respondent profiles of the two data sets are similar. The respondents included more males than females, with most being less than 35 years of age. Approximately 63% of the respondents held a college/university degree or higher. As for their occupation, most respondents were from the blue collar group and full-time students. In terms of income, about 24% earned total monthly incomes of NT$15,000 or less. Finally, the distribution of monthly playing frequency is even, with 19.4% non-gamers and around 16% users playing more than 21 times per month. Detailed descriptive statistics relating to the respondents' profiles are shown in Table 1.

This research explored the associations between monthly playing frequency and socioeconomic status and other variables by using the second-wave data to conduct a cross-tabulation analysis, as shown in Table 2. The six levels of monthly playing frequency gamers were divided into four groups: non-gamers without online game playing experience, low gamers playing once or twice per month, high gamers with playing more than 21 times per month, and moderate gamers playing more than low gamers but less often than the high gamers. A chi-square test of independence suggests the monthly playing frequency and other demographic variables were highly associated (gender, $\chi^2 = 11.329$, $p = 0.01$; education, $\chi^2 = 22.494$, $p = 0.007$; age, $\chi^2 = 70.736$, $p < 0.001$; occupation status, $\chi^2 = 58.843$, $p < 0.001$; and income, $\chi^2 = 69.765$, $p < 0.001$). Specifically, the evidence demonstrates that socioeconomic statuses were mainly associated with monthly playing frequency. Indeed, the detailed cross-tabulation analysis in Table 2 reveals a clear pattern – young male gamers, mainly students or youth with low income, seem to have a dominant role in high-frequency game playing.

EFA results

In order to identify the dimensionality (form of constraint) of consumer attitudes towards online gaming, the 18 items were pooled together, and the factors were analyzed. This

Table 1. Descriptive statistics of the participants' profiles.

Demographic variables		First wave[a]		Second wave[b]	
		Frequency	(%)	Frequency	(%)
Gender	Male	453	58.9	280	56.9
	Female	316	41.1	280	43.1
	Total	769	100	649	100
Education	≤Senior high school	52	6.8	45	6.9
	Junior college	230	29.9	196	30.2
	University	448	58.3	372	57.3
	≥Graduate	39	5.0	36	5.6
	Total	769	100	649	100
Age	13–18	82	10.7	77	11.9
	19–25	334	43.4	283	43.6
	26–35	204	26.5	186	28.7
	36–45	113	14.7	81	12.5
	≥46	36	4.7	22	3.3
	Total	769	100	649	100
Occupation status	White collar	65	8.5	50	7.7
	Blue collar	306	39.8	251	38.7
	Jobless	67	8.7	60	9.2
	Students/full-time	267	34.7	238	36.7
	Student/part-time job	64	8.3	50	7.7
	Total	769	100	649	100.0
Income/per person	≤TWD5000	187	24.3	151	23.3
	TWD5001–10,000	90	11.7	97	14.9
	TWD10,001–15,000	82	10.7	72	11.1
	TWD15,001–30,000	219	28.5	177	27.3
	TWD30,001–45,000	132	17.2	108	16.6
	≥TWD45,001	59	7.7	44	6.8
	Total	769	100	649	100
Monthly playing frequency	Never	149	19.4	106	19.4
	1–2 times	181	23.5	139	21.4
	3–5 times	130	16.9	110	16.9
	6–10 times	105	13.7	96	14.8
	11–20 times	84	10.9	69	10.7
	≥21 times	120	15.6	89	16.8
	Total	769	100	649	100

Note: TWD1 = USD0.03.
[a]First-wave data collection.
[b]Second-wave data collection.

study conducted an EFA using principal components with varimax rotation to formalize the subscales. An eigenvalue of 1.0 was used as the cut-off value to determine the number of constraint dimensions, while a factor loading of 0.6 and high loadings on more than one common factor were used as the two criteria to determine whether the item(s) should be loaded or whether the item(s) should be eliminated. All 769 questionnaires were processed, resulting in 17 constraint items with a six-dimension solution, which conformed to the original theory (Table 3). One physical constraint item was eliminated because the factor loading was less than 0.60. The cumulative explained variance of the six-dimension structure was approximately 76.61%.

Table 2. Cross-tabulation: monthly playing frequency and socioeconomic status.

Demographic variables/monthly playing frequency		Non-gamers	Low gamers	Moderate gamers	High gamers	Total
Gender, χ^2 =11.329, $df = 3$, $p = 0.01$**	Male	58	80	193	68	399
	Female	48	59	122	21	250
	Total	106	139	315	89	649
Education, χ^2 =22.494, $df = 9$, $p = 0.007$**	≤Senior high school	9	10	13	13	45
	Junior college	37	40	100	19	196
	University	51	82	190	49	372
	≥Graduate	9	7	12	8	36
	Total	106	139	315	89	649
Age, $\chi^2 = 70.736$, $df = 12$, $p < 0.000$***	13–18	8	6	20	13	47
	19–25	32	62	161	48	303
	26–35	31	52	92	21	196
	36–45	20	16	39	6	81
	≥46	15	3	3	1	22
	Total	106	139	315	89	649
Occupation status, $\chi2$ =58.843, $df = 12$, $p < 0.000$***	White collar	19	10	20	1	50
	Blue collar	53	64	111	23	251
	Jobless	4	9	39	8	60
	Students/full-time	23	50	131	54	258
	Student/part-time job	7	6	14	3	30
	Total	106	139	315	89	649
Income/per person, χ^2 = 69.765, $df = 15$, $p <$ 0.000***	≤TWD5000	24	32	70	45	171
	TWD5001–10,000	9	29	60	9	107
	TWD10,001–15,000	12	14	37	9	72
	TWD15,001–30,000	22	47	98	10	177
	TWD30,001–45,000	28	11	37	12	88
	≥TWD45,001	11	6	13	4	34
	Total	106	139	315	89	649

CFA and model fit

This study then confirmed the structure of the scale by conducting a CFA on perceived constraints using the second dataset from the present study. At this stage of the analysis, a CFA on the 17 items was employed to validate the derived six-dimension constraint structure at the EFA stage (Figure 1). The CFA model was computed using the LISREL statistics software package. All the goodness-of-fit values were acceptable ($\chi^2 =$ 309.10; $df = 104$; $p = 0.000$; $\chi^2/df = 2.97$; CFI = 0.97, GFI = 0.95, AGFI = 0.92, NFI = 0.96, IFI = 0.97, RMSEA = 0.055) (Hair, Black, Babin, Anderson, & Tatham, 2006). Consequently, the results were viewed as suggesting good model fit to the derived six-dimension structure.

Scale reliability

Coefficient alpha values and CR indices of the six dimensions were computed for reliability tests. All Cronbach's alpha and CR values, ranging from 0.73 to 0.80 (Table 4), exceeded the generally recommended levels of 0.6 (Bagozzi & Yi, 1988). Thus, the results provided evidence of reliability.

Table 3. EFA results of constraint dimensions.

Measurements	Constraint component					
	Psychological	Financial	Time	Social	Performance	Physical
S1	0.203	0.042	0.163	**0.851**	0.124	0.018
S2	0.200	0.068	0.119	**0.857**	0.103	−0.022
S3	0.135	0.134	0.126	**0.697**	0.024	−0.006
T1	0.168	0.143	**0.814**	0.177	0.189	0.110
T2	0.167	0.152	**0.838**	0.143	0.210	0.179
T3	0.241	0.269	**0.679**	0.193	0.160	0.006
F1	0.148	**0.772**	0.188	0.082	0.149	0.120
F2	0.049	**0.785**	0.298	0.089	0.124	0.231
F3	0.093	**0.863**	0.046	0.102	0.114	0.083
PH1	0.143	0.206	0.044	0.032	0.120	**0.874**
PH2	0.040	0.142	0.185	-.055	0.156	**0.872**
PE1	0.058	0.289	0.227	0.058	**0.720**	0.110
PE2	0.153	0.145	0.198	0.061	**0.846**	0.074
PE3	0.153	0.011	0.092	0.134	**0.813**	0.139
PS1	**0.809**	0.088	0.154	0.226	0.194	0.074
PS2	**0.856**	0.130	0.155	0.210	0.093	0.071
PS3	**0.843**	0.088	0.195	0.168	0.103	0.080
Eigenvalues	6.126	2.158	1.386	1.285	1.047	1.021
Variances (%)	36.036	12.696	8.151	7.561	6.160	6.007
Cumulated variances (%)	36.036	48.732	56.883	64.444	70.604	76.611

Note: Significance of bold value: factor loading > 0.6.

Convergent validity

As for the test of convergent validity, there are two measurements to confirm validity. First, significant *t*-value factor loadings were examined for convergent scale validity. Second, when the AVE of a construct is greater than 0.5, then there is convergent validity for the construct. As shown in Table 4, the AVEs of the six constructs are all greater than 0.5. They indicate that there is convergent validity in this study.

Discriminant validity

The discriminant validity was evidenced by (1) the correlation estimate of each pair of any two dimensions less than 1.0, (2) acceptable CFA model fit, (3) AVE values higher than squared correlations between each of the latent dimensions (Fornell & Larcker, 1981), and (4) the fix significantly reducing the fit reported in the baseline CFA (i.e. $\Delta\chi^2 > 3.84$, $p < 0.05$) (Hightower et al., 2002). The correlation estimates of each pair of any two dimensions are all less than 1.0, while physical constraint is different from social constraint (Browne & Woolley, 2004), so shows little correlation. In addition to the acceptable CFA model fit represented previously, the AVE values in Table 3 of this study are all greater than the squared correlations between each of the latent dimensions in Table 5. Finally, the test assessed two estimated constructs by constraining the estimated correlation parameter between them to 1.0, and then a series of chi-square difference tests was conducted on the values obtained for the constrained and unconstrained models. Shown above the diagonal in Table 5, the smallest chi-square difference observed from this procedure ($\Delta\chi^2 = 11.7$, $df = 1$) showed strong evidence of each construct's discriminant validity. Therefore, all discriminant validity indicators fell within acceptable ranges.

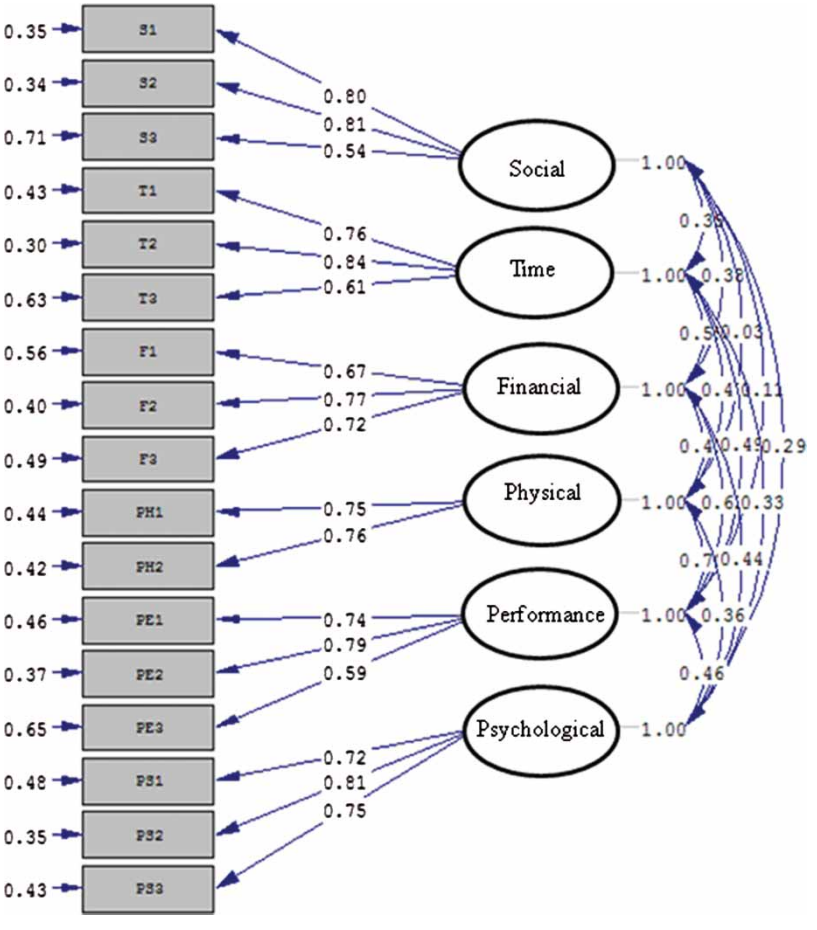

Figure 1. Summary of CFA for constraint.

The estimates of CR and AVE demonstrate that the scales should be considered generally reliable and valid overall. Measurement accuracy analysis statistics are shown below in Table 4.

Table 5 shows the results of correlation and chi-square difference results.

Predictive validity

Predictive validity of a scale is established when the scale is significantly related to a construct it is supposed to predict (Cronbach & Meehl, 1955). Perceived constraint has been tested to be related to online game playing frequency.

Using seven regressions with monthly playing frequency (averaged times played per month) as the dependent variable separately, and using the overall perceived constraint and the six types of constraints' averaged score as the independent variables separately, the study revealed each model to be statistically significant. Worth noting is that perceived constraint in all models had a negative and significant impact on difference in use (overall constraint, $\beta = -2.832$, $p < 0.001$; social constraint, $\beta = -0.776$, $p = 0.005$; time constraint, $\beta = -1.265$, $p < 0.001$; financial constraint, $\beta = -1.357$, $p < 0.001$; physical

Table 4. Measurement accuracy analysis statistics.

Core constructs		Factor loading	*T* value	α	CR value	AVE
Social constraint	S1	0.80***	20.66	0.75	0.77	0.53
	S2	0.81***	20.80			
	S3	0.54***	13.40			
Time constraint	T1	0.76***	20.26	0.77	0.78	0.55
	T2	0.84***	22.82			
	T3	0.61***	15.55			
Financial constraint	F1	0.67***	17.17	0.76	0.76	0.52
	F2	0.77***	20.59			
	F3	0.72***	18.75			
Physical constraint	PH1	0.75***	18.35	0.73	0.73	0.57
	PH2	0.76***	18.55			
Performance constraint	PE1	0.74***	19.72	0.74	0.75	0.51
	PE2	0.79***	21.65			
	PE3	0.59***	15.03			
Psychological constraint	PS1	0.72***	19.07	0.80	0.80	0.58
	PS2	0.81***	21.99			
	PS3	0.75***	20.14			
CFA model fits	Absolute-fit measures $\chi^2/df = 2.97$, GFI = 0.95, CFI = 0.97, RMSEA = 0.055 Incremental-fit measures AGFI = 0.92, NFI = 0.96, IFI = 0.97					

CR: Composite reliability $\rho_c = \left(\sum \lambda\right)^2 / \left[\left(\sum \lambda\right)^2 + \sum(\theta)\right]$, where λ is the indicator loading and θ the indicator error variance.
AVE: Average variance extracted $\rho_v = \left(\sum \lambda^2\right) / \left[\sum \lambda^2 + \sum(\theta)\right]$, where λ is the indicator loading and θ the indicator error variance.
***$p < 0.001$.

Table 5. Correlation and chi-square difference results ($n = 649$).

Research constructs	1	2	3	4	5	6
1. Social constraint	–	68.0	47.1	134.0	160.3	61.5
2. Time constraint	0.35	–	11.7	20.9	49.2	37.7
3. Financial constraint	0.38	0.55	–	18.0	20.1	12.3
4. Physical constraint	0.03	0.47	0.41	–	12.1	23.6
5. Performance constraint	0.11	0.49	0.62	0.70	–	38.5
6. Psychological constraint	0.29	0.33	0.44	0.36	0.46	–

Factor correlations from CFA below the diagonal. $\Delta\chi^2$ test from paired unity correlations above the diagonal.

constraint, $\beta = -0.959$, $p < 0.001$; performance constraint, $\beta = -1.358$, $p < 0.001$; and psychological constraint, $\beta = -1.732$, $p < 0.001$). These results indicate that perceived constraints (overall, social, time, financial, physical, performance, and psychological constraints) have negative effects on online game usage, thus supporting *H1* and *H1a–H1f*.

Considering the robust validity of the measure, this research also separated participants at different monthly playing frequency levels (Table 1) and compared the factors and scales' averaged scores between the high gamers (21+ times per month gaming) and low gamers (one to two times per month gaming). High gamers and low gamers in this study report clear differences in their perceptions of online game constraints. As can be

Table 6. Constraint dimensions comparison on low gamers, high gamers, and non-gamers.

	Low gamers/high gamers			Non-gamers/high gamers		
The scale item of online game constraint	Low[†]	High[‡]	*p*-Values	Non[§]	High[‡]	*p*-Values
Social constraint	3.21	2.88	0.038*	3.38	2.88	0.007**
Time constraint	4.43	3.80	0.001**	4.63	3.80	0.000***
Financial constraint	4.31	3.60	0.000***	4.54	3.60	000***
Physical constraint	5.03	4.51	0.004**	5.07	4.51	0.004**
Performance constraint	4.62	4.05	0.000***	4.57	4.05	0.002**
Psychological constraint	3.96	2.91	0.000***	4.02	2.91	000***

Note: Mean values for the low gamers, high gamers, and non-gamers are based on a 7-point Likert-type scale with strongly disagree =1 to strongly agree = 7 (low gamers: 1–2 times per month gaming; high gamers: 21+ times per month gaming; non-gamers: 0 times per month gaming).
[†]Mean value for the low gamers.
[‡]Mean value for the high gamers.
[§]Mean value for the non-gamers.
*$p < 0.05$.
**$p < 0.01$.
***$p < 0.001$.

observed in Table 6, there was a significant difference found between high and low gamer samples. High gamers have lower constraint perception than low gamers, thus supporting *H2*. Similar results are shown from the comparison of factors and scales' scores between the high gamers (21+ times per month gaming) and a non-gamer sample (0 times per month gaming) (Table 6). High gamers have lower constraint perceptions than non-gamers, thus supporting *H3*. Similar to the previously obtained regression results, the lower the level of constraint is, the higher the usage.

According to the above results, predictive validity of the online game constraint scale is evidence that it is significantly negatively related to the frequency of online game playing. This indicates that the online game constraint scale has predictive validity.

Discussion

Online gaming is the most popular leisure activity in the virtual world, judging from the number of participants, their willingness to pay, and their intentions for future use (Lu & Wang, 2008). Although online gamers demonstrate high levels of attachment to playing online games, online games facilitate potentially deviant behaviours or consequences linked to many negative factors (Liu & Peng, 2009). The negative factors contribute to consumer constraint for playing online games. This study attempts to develop the scale for online game constraints modified from the risk perception viewpoint.

By developing a model to better understand player constraints, this study provides a robust measure of constraint that is reliable, and valid for future research in online gaming. The results indicate that the proposed scale is psychometrically sound with robust model fit, scale reliability, convergent validity, discriminant validity, and predictive validity.

The present study further examined the impact of perceived constraints on online game playing consequences. The present data confirmed that overall constraint (*H1*), social constraint (*H1a*), time constraint (*H1b*), financial constraint (*H1c*), physical constraint (*H1d*), performance constraint (*H1e*), and psychological constraint (*H1f*) were negatively

associated with online game playing frequency, supporting the evidence that constraints would limit or inhibit an individual's definitive participation in an activity (Jackson, 1988). Thus, the present study demonstrated that past online game playing frequency was found to be a negative predictor of constraint perception. Moreover, high gamers have lower constraint perception than low gamers and non-gamers, thus supporting *H2* and *H3*.

Research implications

Theoretical implications

The results of this study shed light on some important issues related to perceived constraints to play online games, which have not been addressed by prior research. Most prior studies have investigated the problematic use or negative outcome associated with playing online games (Caplan, 2002; Liu & Peng, 2009), but they did not demonstrate the possible negative outcomes' effects. The effect of players' negative outcome perceptions will be the main factors that cause adverse impacts on future online game playing. Theoretically, this study extends measurement scales of traditional perceived risk to online game service constraint perceptions. This research has developed a theoretical multidimensional consumer-based measurement to evaluate online game constraint constructs and tried to adopt this scale to predict frequency to play online games. This model is an online information tool employed to assess those constraints and thus to understand their effects on frequency of use of high gamers, low gamers, and non-gamers. Therefore, the online gaming constraint measure developed in this study is designed to provide an effective online information tool to measure consumer-based online game constraints. The scale is also a potential tool for academics, useful for conducting longitudinal research on the impact of leisure constraints on online gaming intention. The ideal type can help solve the puzzle of whether the high gamers become less constrained after they have long enjoyed games, accumulated experience and switching costs, or whether they are somehow the self-selected ones who are by nature less controlled by those constraints.

Managerial implications

From the practical perspective, this study offers the following suggestions for practitioners. Firstly, online game companies can use the constraint measurement tool developed in this study to detect service weaknesses and strengths. Based on their constraint assessments and business strategies, online game companies can allocate corporate resources to the important service constraint attributes uncovered by this study. Secondly, this study finds that perceived constraints are critical to affect players' intentions and online game practitioners should pay attention on customers' constraint perception, such as psychological, performance, financial, and time constraints. Developing and announcing the information through the internet related to the particular short-time, cheap, and free trial game to establish players' experience is associated with attracting promotion. This study also implies that psychological factors are more important in the game industry. By uncovering the factors that cause individuals to perceive constraints during game play, this study contributes necessary information to online game marketers so that they might develop pertinent strategies that decrease constraints and therefore increase the likelihood of online game purchases. Thirdly, this study suggests that developers should consider focusing more on establishing online information of free trial opportunities for low gamers and non-gamers, who perceive higher constraints

related to the online game. For example, games with high level online information of interaction such as free games allow players to experience the activity. The more experienced users are in an online game, the lower constraint they are likely to perceive; thus more users will play the game in the future.

Limitations and future research directions

Several limitations of this study point to avenues for further research. First, the samples are focused on specific respondents residing in Taiwan. The participants in this study may possess attributes and behaviours that differ from those in other geographical locations. Future inquiries could employ more diversified samples across genders and diverse sociocultural environments to verify the dimensions developed in this study and to enhance the generalizability of the research findings. Second, this study provides a cross-sectional analysis of the impact of constraint perception. Future research could explore the longitudinal impacts of consumers' constraint perception on customers' behaviours and intentions. Third, playing online gaming through mobile phones will be an important service trend of the entertainment industry with brilliant recreation opportunities in the near future. Research on mobile online game industries would be useful to improve the understanding of the role of perceived constraint in the mobile market. Finally, experienced years of online games is one important factor. Future research can investigate other important cues, such as how many years a respondent plays within a particular subject matter.

References

Afari, E. (2010). Modeling computer usage intentions of tertiary students in a developing country through the technology acceptance model. *International Journal of Education and Development Using Information and Communication Technology*, *6*(1), 1–16.

Aldás-Manzano, J., Lassala-Navarré, C., Ruiz-Mafé, C., & Sanz-Blas, S. (2009). The role of consumer innovativeness and perceived risk in online banking usage. *The International Journal of Bank Marketing*, *27*(1), 53–75.

Bagozzi, R.P., & Yi, Y. (1988). On the evaluation of structure equations models. *Journal of the Academic of Marketing Science*, *16*(1), 74–94.

Bagozzi, R.P., Yi, Y., & Phillips, L.W. (1991). Assessing construct validity in organizational research. *Administrative Science Quarterly*, *36*(3), 421–458.

Bauer, R.A. (1960). Consumer behavior at risk taking. In S.R. Hancock (Ed.), *Dynamic marketing for a changing world* (pp. 389–398). Chicago, IL: American Marketing Association.

Bhattacherjee, A., & Premkumar, G. (2004). Understanding changes in belief and attitude toward information technology usage: A theoretical model and longitudinal test. *MIS Quarterly*, *28*(2), 229–254.

Browne, C.A., & Woolley, J.D. (2004). Preschoolers' magical explanations for violations of physical, social, and mental laws. *Journal of Cognition and Development*, *5*(2), 239–260.

Buttner, O.B., Schulz, S., & Silberer, G. (2005). Perceived risk and deliberation in retailer choice: Consumer behavior towards online pharmacies. *Advances in Consumer Research*, *33,* 197–202.

Caplan, S.E. (2002). Problematic internet use and psychosocial well-being: Development of a theory-based cognitive-behavioral measurement instrument. *Computers in Human Behavior*, *18*(5), 553–575.

Chang, H.H., & Chen, S.W. (2008). The impact of online store environment cues on purchase intention: Trust and perceived risk as a mediator. *Online Information Review*, *32*(6), 818–841.

Chen, L.S.L. (2010). The impact of perceived risk, intangibility and consumer characteristics on online game playing. *Computers in Human Behavior*, *26*(6), 1607–1613.

Chuang, Y. (2006). Massively multiplayer online role-playing game-induced seizures: A neglected health problem in Internet addiction. *CyberPsychology and Behavior*, *9*(4), 451–456.

Cole, H., & Griffiths, M. (2007). Social interactions in massively multiplayer online role-playing gamers. *CyberPsychology and Behavior*, *10*(04), 575–583.
Crawford, D.W., & Godbey, G. (1987). Reconceptualizing barriers to family leisure. *Leisure Sciences*, *9,* 119–127.
Cronbach, L.J., & Meehl, P.E. (1955). Construct validity for psychological tests. *Psychological Bulletin*, *52,* 281–302.
Cummings, W.H., & Venkatesan, M. (1976). Cognitive dissonance and consumer behavior: A review of the evidence. *Journal of Marketing Research*, *13*(3), 303–308.
Deng, L., Turner, D.E., Gehling, R., & Prince, B. (2010). User experience, satisfaction, and continual usage intention of IT. *European Journal of Information Systems*, *19*(1), 60–75.
DFC Intelligence. (2006). *Online game market forecasted to reach $13 billion by 2011*. Retrieved from November 12, 2010, http://www.dfcint.com/news/prjune62006.html
Festinger, L. (1957). *A theory of cognitive dissonance*. Evanston, IL: Row, Peterson.
FIND. (2010). *2009 Survey of current state and level of demand on household broadband (1)*. Retrieved from November 31, 2010, http://www.find.org.tw/eng/news.asp?msgid-480&subjectid=4&pos=0
Foley, C., Holzman, C., & Wearing, S. (2007). Moving beyond conspicuous leisure consumption: Adolescent women, mobile phones and public space. *Leisure Studies*, *26*(2), 179–192.
Fornell, C., & Larcker, D.F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, *18*(1), 39–50.
Forsythe, S., Liu, C., Shannon, D., & Gardner, L.C. (2006). Development of a scale to measure the perceived benefits and risks of online shopping. *Journal of Interactive Marketing*, *20*(2), 55–75.
Fraedrich, J.P., & Ferrell, O.C. (1992). The impact of perceived risk and moral philosophy type on ethical decision making in business organizations. *Journal of Business Research*, *24*(4), 283–295.
Godbey, G., Crawford, D.W., & Shen, X.S. (2010). Assessing hierarchical leisure constraints theory after two decades. *Journal of Leisure Research*, *42*(1), 111–134.
Goyal, A. (2008). Managing perceived risk for credit card purchase through supplementary services. *Journal of Financial Services Marketing*, *12*(4), 331–345.
Guo, Y., & Barnes, S. (2009). Virtual item purchase behavior in virtual worlds: An exploratory investigation. *Electronic Commerce Research*, *9*(1/2), 77–96.
Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E., & Tatham, R.L. (2006). *Multivariate data analysis* (6th ed.). Upper Saddle River, NJ: Prentice Hall.
Hightower, R., Brady, M.K., & Barker, T.L. (2002). Investigating the role of the physical environment in hedonic service consumption: An exploratory study of sporting events. *Journal of Business Research*, *55*(9), 697–707.
Hofacker, C.F. (2008). E-tail constraints and tradeoffs. *Direct Marketing*, *2*(3), 129–143.
Igbaria, M., Parasuraman, S., & Baroudi, J.J. (1996). A motivational model of microcomputer usage. *Journal of Management Information Systems*, *13*(1), 127–143.
Jackson, E.L. (1988). Leisure constraints: A survey of past research. *Leisure Sciences*, *10,* 203–215.
Jackson, E.L. (2005). *Constraints to leisure*. State College, PA: Venture Publishing.
Johnson, M.S., Sivadas, E., & Garbarino, E. (2008). Customer satisfaction, perceived risk and affective commitment: An investigation of directions of influence. *The Journal of Services Marketing*, *22*(5), 353–362.
Keil, M., Tan, B.C.Y., Wei, K., Saarinen, T., Tuunainen, V., & Wassenaar, A. (2000). A cross-cultural study on education of commitment behavior in software projects. *MIS Quarterly*, *24*(2), 299–325.
Kettinger, W.J., & Grover, V. (1997). The use of computer-mediated communication in an organizational context. *Decision Sciences*, *28*(3), 513–555.
Kim, M.G., & Kim, J. (2010). Cross-validation of reliability, convergent and discriminant validity for the problematic online game use scale. *Computers in Human Behavior*, *26*(3), 389–398.
Krasnova, H., Spiekermann, S., Koroleva, K., & Hildebrand, T. (2010). Online social networks: Why we disclose. *Journal of Information Technology*, *25*(2), 109–125.
Laroche, M., McDougall, G.H.G., Bergeron, J., & Yang, Z. (2004). Exploring how intangibility affects perceived risk. *Journal of Service Research*, *6*(4), 373–389.
Liao, C., Lin, H.N., & Liu, Y.P. (2010). Predicting the use of pirated software: A contingency model integrating perceived risk with the theory of planned behavior. *Journal of Business Ethics*, *91*(2), 237–252.

Lim, N. (2003). Consumers' perceived risk: Sources versus consequences. *Electronic Commerce Research and Applications*, *2*(3), 216–228.
Link, P., & Marxt, C. (2004). Integration of risk and chance management in the cooperation process. *International Journal of Production Economics*, *90*(1), 71–78.
Liu, M., & Peng, W. (2009). Cognitive and psychological predictors of the negative outcomes associated with playing MMOGs (massively multiplayer online games). *Computers in Human Behavior*, *25*(6), 1306–1311.
Lu, H.P., & Wang, S.M. (2008). The role of Internet addiction in online game loyalty: An exploratory study. *Internet Research*, *18*(5), 499–519.
Luo, M.M., Chen, J.S., Ching, R.K.H., & Liu, C.C. (2011). An examination of the effects of virtual experiential marketing on online customer intentions and loyalty. *The Service Industries Journal*, doi:10.1080/02642069.2010.503885.
Mitchell, V.W. (1999). Consumer perceived risk: Conceptualisations and models. *European Journal of Marketing*, *33*(1/2), 163–195.
Miyazaki, A.D., & Fernandez, A. (2001). Consumer perceptions of privacy and security risks for online shopping. *The Journal of Consumer Affair*, *35*(1), 27–44.
Nelson, R.R., & Cheney, P.H. (1997). Training end users: An exploratory study. *MIS Quarterly*, *11*(4), 547–559.
Ng, B.D., & Wiemer-Hastings, P. (2005). Addiction to the Internet and online gaming. *CyberPsychology and Behavior*, *8*(2), 110–113.
Nicolaou, A.I., & McKnight, D.H. (2006). Perceived information quality in data exchanges: Effects on risk, trust, and intention to use. *Information Systems Research*, *17*(4), 332–441.
Noort, G.V., Kerkhof, P., & Fennis, B.M. (2008). The persuasiveness of online safety cues: The impact of prevention focus compatibility of Web content on consumers' risk perceptions, attitudes, and intentions. *Journal of Interactive Marketing*, *22*(4), 58–72.
Oliveira, M., & Henderson, T. (2003). What online gamers really think of the Internet? *Proceedings of the 2nd workshop on Network and system support for games*, Redwood City, California, 22–23, May, pp. 185–193.
Oliver, R.L. (1980). A cognitive model of the antecedents and consequences of satisfaction decisions. *Journal of Marketing Research*, *17*(4), 460–469.
Pavlou, A.P. (2003). Consumer acceptance of electronic commerce: Integrating trust and risk with the technology acceptance model. *International Journal of Electronic Commerce*, *7*(3), 69–103.
Raymore, L.A., Godbey, G.C., & Crawford, D.W. (1994). Self-esteem, gender, and socioeconomic status: Their relation to perceptions of constraint on leisure among adolescents. *Journal of Leisure Research*, *26,* 99–118.
Sharp, C.E., & Rowe, M. (2006). Online games and e-business: Architecture for integrating business models and services into online games. *IBM Systems Journal*, *45*(1), 161–179.
Shen, C.C., & Chiou, J.S. (2010). The impact of perceived ease of use on internet service adoption: The moderating effects of temporal distance and perceived risk. *Computer in Human Behavior*, *26*(1), 42–50.
Sterm, D.E., Lamb, C.W., & MacLachian, D.L. (1977). Perceived risk: A synthesis. *European Journal of Marketing*, *11*(4), 312–319.
Stone, R.N., & Grønhaug, K. (1993). Perceived risk: Further consideration for the marketing discipline. *European Journal of Marketing*, *27*(3), 39–50.
Swap, W.C., & Rubin, J.Z. (1993). Measurement of interpersonal orientation. *Journal of Personality and Social Psychology*, *44*(1), 208–219.
Tsiros, M., & Heilman, C.M. (2005). The effect of expiration dates and perceived risk on purchasing behavior in grocery store perishable categories. *Journal of Marketing*, *69*(2), 114–129.
Walker, G.J., Jackson, E.L., & Deng, J. (2008). The role of self-construal as an intervening variable between culture and leisure constraints: A comparison of Canadian and mainland Chinese university students. *Journal of Leisure Research*, *40*(1), 90–109.
Walter, Z., Gupta, A., & Su, B.C. (2006). The sources of on-line price dispersion across product types: An integrative view of on-line search costs and price premiums. *International Journal of Electronic Commerce*, *11*(1), 37–79.
Wan, C.S., & Chiou, W.B. (2007). The motivations of adolescents who are addicted to online games: A cognitive perspective. *Adolescence*, *42*(165), 179–197.
Yee, N. (2006). Motivations for play in online games. *CyberPsychology & Behavior*, *9*(6), 772–775.

Yeung, R.M.W., & Morris, J. (2006). An empirical study of the impact of consumer perceived risk on purchase likelihood: A modelling approach. *International Journal of Consumer Studies*, *30*(3), 294–305.
Yeung, R., Yee, W., & Morris, J. (2010). The effects of risk-reducing strategies on consumer perceived risk and on purchase likelihood: A modelling approach. *British Food Journal*, *112*(3), 306–322.
17173 NEWS. (2008) *NetDragon announces its first annual results since listing*. Retrieved from November 12, 2010, http://english.17173.com/content/2008-03-23/20080323131745040.shtml

Appendix

Questionnaire items

Social constraint

S1. If I play online games, I would be viewed negatively by my peers.
S2. Playing online game causes me to be thought of as foolish by some people whose opinion I value.
S3. I will be incompatible with my friends if they do not also play online games.

Time constraint

T1. Playing online games could lead to inefficient use of my time.
T2. Playing online games could involve important time losses.
T3. The demands on my schedule are such that playing online games concerns me because it could create even more time pressures on me that I do not need.

Financial constraint

F1. If I play online games within the next 12 months, I would be concerned that the financial investment I would make would not be wise.
F2. Playing online games could involve significant financial losses.
F3. If I play online games within the next 12 months, I would be concerned that I would not receive my money's worth.

Physical constraint

PH1. One concern I have about playing online games within the next 12 months is that eye strain for some members of the family could result, due to overuse of the computer.
PH2. Playing online games within the next 12 months leads to concerns about whether the activity could lead to some uncomfortable physical side effects, such as poor sleep, backaches, etc.

Performance constraint

PE1. If I were to play online games within the next 12 months, I would become concerned that online games will not provide the level of benefits that I would expect.
PE2. As I consider online game playing, I worry about whether it will really 'perform' as well as it is supposed to.
PE3. The thought of playing online games causes me to be concerned about how reliable the service will be.

Psychological constraint

PS1. The thought of playing online games gives me a feeling of unwanted anxiety.
PS2. The thought of playing online games makes me feel psychologically uncomfortable.
PS3. The thought of playing online games causes me to experience unnecessary tension.