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Gaming motivations, avatar-self identification and symptoms of online game addiction

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This study conducted a survey of 217 adult game players in Hong Kong to explore the effects of gaming motivations and avatar-self identification on symptoms of online game addiction. Results show that avatar-self identification is positively associated with the problems and salience dimension as well as the uncontrollable game-play dimension of game addiction. The motivation to relax is positively related to perceived avatar-self identification and uncontrollable play; the motivation to socialize in online games is positively linked with the avatar-self identification and both symptoms of online game addiction. The motivation to escape is positively related to the symptom of problems and salience. The drive to achieve virtual accomplishment in online games is negatively associated with the problem caused by gameplay and the salience of online games.

Keywords: computer-mediated communication; media effect; survey; Hong Kong

Introduction

There is ample evidence that playing online games can be addictive (e.g. Chuang, 2006; Lee & LaRose, 2007; Yee, 2002). Researchers have made great efforts to explore the diagnosis of game addiction (e.g. Young, 2009; Zhou & Li, 2009), the psychological antecedents of game addiction (e.g. Chou, Condron, & Belland, 2005; Mehroof & Griffiths, 2010), the physical or psychosocial problems caused by game addiction (e.g. Chiu, Lee, & Huang, 2004; Chuang, 2006; Lee & Shin, 2004), and the treatments of game addiction (e.g. Griffiths & Meredith, 2009). However, the roles of players’ gaming motivation and player-avatar relationship in excessive gaming have not yet been explored adequately in previous research.

Unlike consumptions of traditional media in which the audience has little direct influence on the media content, the computer gaming experience is interactive. Gamers can play the same game in quite different ways and the same player can also create dissimilar game narratives and experience each time they play. As such, different players might be drawn to the same game for completely different reasons. For example, when playing the popular massively multiple-player online role-playing games (MMORPGs) such as the World of Warcraft (WoW), many gamers like the fierce competitions and fighting actions offered by the game while some others focus on building and maintaining virtual social relationships with other players (Yee,
The diverse online gaming motivations would then likely to influence an individual player's 'behaviors' in the virtual world, determining whether he/she prefers solo-play or collective-play, to what extent he/she would like to cooperate and communicate with other gamers, and how much he/she devotes time and energy to the development of his/her virtual character, etc.

When playing computer games a player typically controls the actions of an in-game character to achieve various objectives. These characters, being the digital representations of the game players in the virtual space, are known as avatars. In most narrative-based role-playing games, an avatar often has a name, gender, physical appearance, profession, intelligence, and strength or magic power (Klang, 2004; Lim & Reeves, 2006; Webb, 2001). Many games would allow the human players to determine how an avatar would be called and how it should look like. The gamers would also control their avatar's in-game behaviors to cope with challenges, achieve goals, alter game narratives, and maintain a social life in the game world. Different genres of computer games may offer a wide range of possibilities for human players to be connected to their avatars. For example, in many puzzle games and shooting games, avatars only serve the purpose of being a form of identification; players are only tied to their avatars by scores and hence do not necessarily initiate emotional attachment. In contrast, avatars in role-playing games and strategic games often 'grow up' and 'journey through' the game narratives with the human players; the players and their avatars often form a complicated and a much more intimate connection with strong emotional feelings. Regardless of game genre or how the players would play them, however, gamers' perception of the human–avatar interaction might reflect how much they feel attached to and identify with the avatars (Ko et al., 2006), and a deeper understanding of human–avatar relationship is crucial for examining gamers’ behaviors, the psychological drives behind these behaviors and the consequence of the behaviors in online games (Lewis, Weber, & Bowman, 2008).

This study aims to shed light on the mechanisms of online game addiction by harnessing the motivational appeal of gameplay and the perception of avatar-self identification.

Effects of online gaming motivations on online game addiction

Various terms (such as game addiction, game dependency, excessive gameplay, compulsive gameplay, pathological gameplay, problematic gameplay) have been coined to describe the phenomenon of game overuse. Although the terminology about game addiction is still of great controversy (Lemmens, Valkenburg, & Peter, 2009), researchers generally agree that excessive use of video games can be psychologically or physically detrimental (Griffiths & Davies, 2005; Mendelson & Mello, 1986). Because of a capacity for allowing supportive group play and social interactions among gamers, online games are found to be more addictive than offline games (Griffiths, Davies, & Chappell, 2004). In order to measure game addiction, many studies have adapted the diagnostic criteria for pathological gambling found in Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2000). Seven underlying criteria have been widely identified: salience, tolerance, mood modification, relapse, withdrawal, conflict, and problems (Lemmens et al., 2009). Similarly, the World Health Organization outlined the primary
symptoms of online game addiction: craving, tolerance, withdrawal symptoms, loss of control, neglect of other activities, and other negative consequences (Griffiths & Meredith, 2009). Chen and Park (2005) explained that a flow experience is the main cause of game addiction, in which a player’s consciousness would be focused on a narrow field and all irrelevant things are filtered out, so that the individual might lose sensibility and sense of time. Empirical evidence has also shown that excessive gameplay would be harmful to peoples’ physical health, psychological wellbeing, social relationships, and performance in study or work (e.g. Chiu et al., 2004; Chuang, 2006).

To prevent people from being addicted to online games, it is necessary to identify the causal factors of game addiction. Researchers found personality, psychosocial problems, socio-environmental factors, and game design to be possible predictors of game addiction. However, while the crucial roles of online gaming motivations and the players’ perception of avatar-self relationship in fostering tendencies of online game addiction have been discussed by some researchers (cf. Hsu, Wen, & Wu, 2009; Xu, Turel, & Yuan, 2012; Yee, 2002), they have not been closely examined.

Media use is a goal-driven activity because the users actively seek out media content to gratify their wants, and mass media may provide alternative choices to fulfill users’ needs (Katz, Blumler, & Gurevitch, 1974). Furthermore, the communication behavior of each person emanates from various social and psychological factors, and different individuals might use media in quite different ways (Wu, Wang, & Tsai, 2010). As such, ‘gratification sought’ can also be understood as the motivation to consume specific media (David, 2009).

Motivation is the inner force of individuals that drives them to take actions and pursue anticipated achievements (Kunda, 1990; Wan & Chiou, 2006a). When it comes to electronic games, different people may be motivated by different needs even if they play the same game, thus the process of gameplay yields unique meaning and consequence for each single player (Caplan, Williams, & Yee, 2009). Bartle (1996) classified the players of text-based Multi-User Dungeon (MUD) into four types: killers who like to kill other players’ avatars to gain virtual power, achievers who wish to pursue personal achievement in the virtual world, socializers who want to interact with other players, and explorers who enjoy exploring the virtual land. Yee (2006b) grouped online gamers into three types. The first type is achievement-oriented and always shows a great desire to gain power, progress rapidly, and accumulate virtual wealth. The second type is social-oriented, and they are active in interacting and cooperating with other gamers. For many players, the social functions are the most appealing features of online games (Griffiths et al., 2004). The Chinese Annual Report of Online Games reported that the favorite thing the players like to do in a game was to make friends; making friends was the third important reason to play an online game; the departure of friends was the fifth important reason for a player to quit a game (iResearch.com, 2005). Whang and Chang (2004) noted that the online game world should not simply be considered as an entertainment medium, but as a social place where new types of human relationships are formed. Social gamers are prone to dedicating both time and energy to socialization in the virtual world; many social gamers like to help and communicate with other players, with an expectation for long-term meaningful relationships; social gamers often join in-game communities for the sake of companionship (Caplan et al., 2009). The third type of gamers is immersion-oriented. One representative group of them is called escapist. According
to Yee (2006b), escapists seek to forget the troubles in real life, and they tend to do anything to drain off the discontent from the real world, such as attacking other gamers as an approach to relieve negative mood, or joining a raid group to kill monsters, or chatting with other gamers about their troubles. Kim and colleagues (Kim, Par, Kim, Moon, & Chun, 2002) found that diversion (operationalized as ‘escape from reality’) is a primary motive for playing online games.

In addition to the above-mentioned three types of gaming motivations, we have to admit that sometimes people play online games just for relaxation. There are plenty of evidences that enjoyment is a strong determinant of the intentions to play online games (Chen, Chen, & Ross, 2010; Wu et al., 2010). Chen et al. (2010) considered that many people treat online games to be simply a way to pass time and entertain. Users are basically driven by a desire for cheerfulness in the fantasy world. Wu and Liu (2007) also reported that enjoyment of online gaming is positively related to the intentions to play online games.

These four dimensions of motivations might have very different influences on how individuals engaging in gameplay. It is possible that the motivations of playing games determine the extent to which the players are absorbed in the game world. Based on the functional perspective, Xu et al. (2012) argued that as rational humans, game players would apply a conscious decision-making process to maximize their subjective utility. From this perspective, a desire to play games would imply that there is a gap between one’s current status and what the person wishes to be; gamers perceive playing games as an effective way to close the gaps (Clary et al., 1998). When such motivational needs become constant, frequent, and strong, and when playing games can always satisfy such needs, a person would be very likely to play games compulsively (Robinson & Berridge, 2003).

A number of empirical studies have addressed the question of how gaming motivation affects the possibility of game addiction. Wan and Chiou (2006b) revealed that online gaming meant differently to addicted gamers and non-addicted ones. For the addicts, playing games would not bring satisfaction, but if they could not play games, feelings of dissatisfaction would arise; so they would play games compulsively to discharge this feeling of unhappiness. For the nonaddicts, online gaming could satisfy their needs, but the absence of games will not cause dissatisfaction. In their 2007 study, Wan and Chiou (2007) compared gaming motivations of addicted adolescents and nonaddicted ones; they discovered that intrinsic motivations (such as curiosity and exploration, a sense of belonging, autonomy, competence) play a more crucial role in causing game addiction than extrinsic motivations (such as praise from others, money, power, fame) do. Xu et al. (2012) proposed that gaming for advancement and mastering the mechanics, for social relationship, and for escapism would all be positively related to game addiction. However, their data only supported the positive effects from the motivations of socialization and escapism, but not the other motivations. Hellstrom, Nilsson, Leppert, and Aslund (2012) conducted a survey of 7757 Swedish adolescents and found that the motivations for fun and social interactions reduced the risk of negative consequence including game addiction whereas the motivation to escape, to obtain social status, or peer pressure increased the risk of negative consequences. The empirical evidence from these previous studies clearly shows that there is a connection between gaming motivations and game addiction. However, the findings are somewhat inconsistent and unclear about how they are related. This
might have been caused by different research subjects and diverse measurement scales used in these studies. As such we ask:

**RQ1: How would the four types of gaming motivations be related to online game addiction?**

**Effects of avatar-self identification on online game addiction**

Avatars are closely related to their human users’ sense of ‘self.’ Avatars have the capacity to facilitate computer-mediated interactions and the transmission of nonverbal cues, such as gestures, postures, movements, and facial expressions (Bente, Ruggenberg, Kramer, & Eschenburg, 2008). They can also accurately convey players’ affects, emotions, personality, and various aspects of the self (Bailenson, Blascovich, & Guadagno, 2008; Dunn & Guadagno, 2012). Yee (2006a) classified avatars into two categories: a projection or idealization of one’s identity and a try for new identities. McCreery, Krach, Schrader, and Boone (2012) pointed out that computer users would often create multiple avatars with more than one accounts; these independent avatars are disconnected from each other, but perform together as a collective self.

In online games, humans and their avatars are connected through multiple channels. On a mechanical level, an individual human player is allowed to choose a unique avatar to act out and personalize the avatar by selecting particular gender, weapons, professional skills, and customizing its appearance. On a psychological level, game players invest significant psychological resources to ‘nurture’ and ‘dress up’ their avatars by advancing them in the games. Moreover, during the process of leveling up one’s own avatars and interacting with other gamers’ avatars, a player needs to integrate perception, cognition, emotion, actions, and strategies to survive the keen competition, consequently a strong feeling of human–avatar interactions is produced (Grodal, 2000). The avatar-mediated vicarious experience can be understood as a way for players to display the uniqueness of their individuality and the ‘self’ (Lim & Reeves, 2006). Lewis et al. (2008) used ‘character attachment’ to describe such a process of psychological merging of game players’ mind and their avatars’ mind. They conceptualized character attachment as a multidimensional construct that involves feelings of friendship, identification, suspension of disbelief, responsibility for media character’s actions, and a heightened sense of control over character actions (see also Bowman, Schultheiss, & Schumann, 2012).

In the current study we focus on a player’s identification with the avatar as a central concern. Identification is a psychological process in which the audience imagine themselves becoming a media character and take the perspectives, goals, and identity of the character (Cohen, 2001; Lewis et al., 2008). Scholars found that identification is a strong drive of media consumption and a crucial source of media attraction (Cohen, 2001; Looy, Courtois, Vocht, & Marez, 2012). Looy et al. (2012) posited that avatar identification could be unpacked as similarity identification and wishful identification. Similarity identification refers to the procedure that individuals put themselves in the place of media characters and vicariously participate in the experiences of the characters (Hoffner & Buchanan, 2005). Wishful identification refers to a mental process whereby a person desires to be like the media character or emulates the character (Konijn, Bijvank, & Bushman, 2007).
Looy et al. (2012) further elaborated why similarity identity and wishful identity would be associated with game addiction. They argued that on the one hand, people like similar others because they can provide more rewarding interactions and personally relevant information (Hoffner & Buchanan, 2005). In the context of online games, people tend to like fictional characters that resemble themselves (Konijn & Hoorn, 2005). Ducheneaut, Wen, Yee, and Wadley (2009) found that gamers are more satisfied with their characters when they feel that the avatars’ personality resembles their own. Lim and Reeves (2009) noted that the degree to which players feel that their own avatars represent themselves shortens the psychological distance between human players and the artificial avatars and makes playing games a self-relevant activity. As a result, players would be motivated to spend considerable time, psychological and monetary resources to the development of the avatars (Lim & Reeves, 2009), which would increase the risk of addiction.

On the other hand, identifying with a successful character would help reducing self-discrepancy and make an individual feeling better about themselves (Higgins, 1987). As such, the player is likely to indulge in the virtual world (Looy et al., 2012). Smahel, Blinka, and Ledabyl (2008) found that those who viewed their avatars as being important might show greater avatar-self identification and devote not only much more time into the growth of the avatars, but also a greater deal of emotion than those who did not. Moreover, players with a greater risk of being addicted to the games tended to view their avatars as being superior and more often showed a desire to become as successful or strong as their avatars.

Based on the above reasoning, it can be argued that avatar-self identification reflects the extent to which the players regard their avatars as surrogates or idealized versions of the self, how they are attached to their digital representations, and how much they would devote cognition or emotion into the growth of the avatars. The more players feel attached to their avatars through identification, the more resources they would devote to ‘groom’ and ‘nurture’ their avatars. We thus hypothesize that:

**H1:** Online game players’ avatar-self identification will be positively related to the symptoms of online game addiction.

In addition to the effects of motivation and avatar-self identification on game addition, we also want to explore the relationships between gaming motivations and avatar-self identification. Only a few studies examined such connections empirically. For instance, Lewis et al. (2008) found that character attachment is positively associated with time spent playing games, game addiction, and motivations to play games for fantasy, diversion, and social interaction purposes. Zhao, Wang and Zhu (2010) suggested that the sustainability of playing online games would depend largely on the depth of avatar-self identification.

As it was discussed earlier, gaming motivations might influence an avatar’s virtual behavior, as such they would also likely affect how the players take the avatars as important in the process of gaming. For example, socializers and achievers may invest much more cognition and emotion to their game characters, and therefore feel more attached to the lives of their avatars than escapers and casual gamers, for whom the joy of gaming does not necessarily depend on the performance of the avatars. As such, we ask:
RQ2: Will avatar-self identification mediate the effects of gaming motivations on game addiction?

Method
Sample
An online survey was conducted to test the hypothesis and address the research questions. Students in two public universities in Hong Kong were invited to complete an online questionnaire. A total of 217 participants completed the online survey; 43.3% of them were males, 44.7% of them were females, while about 12% of them did not report their sex. The mean age of the subjects was 21.64 (SD = 2.29), ranging from 18 to 37. Overall, the sample showed a very high level of Internet usage: 81.1% of the participants reported daily Internet use; 59.4% of them said that they would spend three or more hours online every day; 41.6% of the participants reported that they had played online games for more than 5 years. Seventy-eight percent of them played online games less than 10 hours per week and 75% of them played for less than 2 hours in a typical game session. Although the participants played online games less excessively than we expected, they ranked differently in different symptoms of online game addiction. Since there is no official cutoff points to make a judgment about whether one player is addicted or not (Block, 2008), scholars often treat online game addictions as a continuous concept – ranging from low to high (e.g. Lemmens et al., 2009; Smahel et al., 2008; Wan & Chiou, 2006a). It is assumed that all players may score at certain level of addiction, though most players are ordinary users and rank lowly in the addiction scale (Turel, Serenko, & Giles, 2011; Xu et al., 2012). This study did not focus on a specific type of online game. Table 1 shows the online gaming frequencies for different game genres, with 1 referring to ‘never’ and 7 referring to ‘very frequently’.

Measurement
Gaming motivations
Gaming motivations were measured according to Yee’s (2006b) and Chen et al.’s (2010) conceptualizations. Gaming motivations were grouped into four types: relax, socialize, achieve and escape. All the items were measured on a 7-point scale and the scores of the items were aggregated to create a single measure of a specific motivation.

Avatar-self identification
Avatar-self identification reflects the extent to which an individual player thinks his/her avatar is an ideal projection of self or an extension of self in the cyberspace. The respondents were asked to agree or disagree with a series of statements on a 7-point scale. The answers to these questions were added up to create a single scale measurement of avatar-self identification. The statements were: ‘I am attracted by my avatars’; ‘My avatar is an extension of myself in the game world’; ‘My avatar is what I want to be’; ‘My avatar shows all my personality’; ‘My avatar is more successful than I am.’ As avatar-self identification is a new concept and there is no well-established scale to measure it, this study tested the validity of the scale. First, all
<table>
<thead>
<tr>
<th>Frequency</th>
<th>Sports game (%)</th>
<th>Race game (%)</th>
<th>Shooting game (%)</th>
<th>Fighting game (%)</th>
<th>Simulation game (%)</th>
<th>RPG game (%)</th>
<th>Card game (%)</th>
<th>Puzzle game (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Never)</td>
<td>14.7</td>
<td>11.5</td>
<td>22.5</td>
<td>28.4</td>
<td>11.5</td>
<td>11.0</td>
<td>14.7</td>
<td>7.3</td>
</tr>
<tr>
<td>2</td>
<td>23.9</td>
<td>25.2</td>
<td>25.2</td>
<td>31.7</td>
<td>17.4</td>
<td>16.1</td>
<td>32.1</td>
<td>19.7</td>
</tr>
<tr>
<td>3</td>
<td>19.3</td>
<td>17.4</td>
<td>14.2</td>
<td>11.9</td>
<td>11.9</td>
<td>13.3</td>
<td>14.2</td>
<td>15.1</td>
</tr>
<tr>
<td>4</td>
<td>12.8</td>
<td>16.1</td>
<td>11.9</td>
<td>12.8</td>
<td>17.9</td>
<td>16.1</td>
<td>11.9</td>
<td>21.1</td>
</tr>
<tr>
<td>5</td>
<td>13.8</td>
<td>16.5</td>
<td>13.8</td>
<td>8.3</td>
<td>16.5</td>
<td>17.0</td>
<td>17.0</td>
<td>23.9</td>
</tr>
<tr>
<td>6</td>
<td>8.7</td>
<td>11.5</td>
<td>6.0</td>
<td>5.0</td>
<td>17.0</td>
<td>17.9</td>
<td>6.9</td>
<td>10.6</td>
</tr>
<tr>
<td>7 (Very frequently)</td>
<td>6.9</td>
<td>1.8</td>
<td>6.4</td>
<td>1.8</td>
<td>7.8</td>
<td>8.7</td>
<td>3.2</td>
<td>2.3</td>
</tr>
</tbody>
</table>
the item-total correlations were significant and bigger than 0.78, which indicated satisfactory internal consistency. Secondly, the result of principle component factor analysis showed that these five items converged in one factor and it represented similarity identity and wishful identity (Looy et al., 2012). The factor explained 66.56% of the variance and all of the factor loadings were bigger than 0.76, demonstrating good construct validity. In addition, the test of reliability showed that Cronbach’s $\alpha$ was 0.87, indicating a good reliability.

**Symptoms of game addiction**

Symptoms of game addiction were measured by Huh and Bowman’s (2008) 15-item Game Addiction Test that was based on two separate addiction scales found in Horvath’s (2004) television addiction measure and Griffiths and Hunt’s (1998) computer game dependence measure. We calculated the overall ‘addiction score’ value for each player as the aggregated value of the answers to these 15 questions. The descriptive analysis showed that our sample displayed low level of overall game addiction (minimum = 15, maximum = 102, mean = 43.43, SD = 19.43). To further explore how people vary in different symptoms of game addiction, a principal components factor analysis was conducted. Two factors emerged: the first one reflected the problems caused by excessive play and the salience of gameplay ($\alpha = .95$) and the second one focused on the loss of controlling the time of playing games ($\alpha = 0.92$). These two factors explained 72.14% of the variance in the measure of game addiction and all of the factor loadings were bigger than 0.59. The distribution of the problems and salience factor was skewed (skewness/standard error of skewness = 5.5), which implied that only a small part of our sample felt that online games were the most important thing and playing online games was causing problems in their daily lives. The symptom of losing the control of time was normally distributed (skewness/standard error of skewness = 0.02), demonstrating that the disability to control the time of playing online games was the biggest trouble of our sample. Table 2 presents the addiction scale items and the factor loadings of the items.

Table 3 presents the description and reliability for all of the involved variables. Table 4 reports the correlation matrix of the independent variables and the dependent variables. The moderate correlations among the four types of gaming motivations indicate discriminant validity.

**Data analysis and results**

To answer research question 1, a path analysis was tested with the four types of gaming motivations as independent variables and the two types of online game addiction symptoms as dependent variables. However, the model goodness-of-fit indices of the first model were not acceptable (Chi-square = 4.16, df = 1, $p = 0.04$, RMSEA = 0.12, CFI = 0.99, NNFI = 0.91, SRMR = 0.02), therefore this direct model was rejected.

In order to test hypothesis 1 and answer the research questions, a second path model was developed. In this model the four types of gaming motivations were treated as independent variables, symptoms of game addiction was the dependent variables, and avatar-self identification was included a mediator. This model not only tested the direct effect of motivations on game addiction symptoms, but also
Table 2. Online game addiction scale and the corresponding factor loadings.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Item</th>
<th>Factor loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problems and salience (α = 0.95)</td>
<td>My game has created real problems for me, but I keep playing</td>
<td>0.76</td>
</tr>
<tr>
<td></td>
<td>I keep playing game even though it is causing serious problem in my life</td>
<td>0.83</td>
</tr>
<tr>
<td></td>
<td>I keep playing game even though my loved ones can’t stand it</td>
<td>0.77</td>
</tr>
<tr>
<td></td>
<td>Sometimes I feel like my whole life revolves around the game</td>
<td>0.83</td>
</tr>
<tr>
<td></td>
<td>My family members get angry and tell me I play too much game, but I can’t stop</td>
<td>0.71</td>
</tr>
<tr>
<td></td>
<td>I sometimes feel like my game playing is alienating my loved ones</td>
<td>0.59</td>
</tr>
<tr>
<td></td>
<td>I feel like I play more game than I used to in order to feel the same</td>
<td>0.78</td>
</tr>
<tr>
<td></td>
<td>When I am unable to play game, I miss it so much that you could call it “withdrawal”</td>
<td>0.63</td>
</tr>
<tr>
<td></td>
<td>Game playing takes up almost all of my leisure time</td>
<td>0.74</td>
</tr>
<tr>
<td></td>
<td>I spend much more time playing game than just about anything else</td>
<td>0.69</td>
</tr>
<tr>
<td>Uncontrollable play (α = 0.92)</td>
<td>Sometimes I only plan to play game for a few minutes, and wind up spending hours in front of it</td>
<td>0.76</td>
</tr>
<tr>
<td></td>
<td>I often play games for a longer time than I intended</td>
<td>0.83</td>
</tr>
<tr>
<td></td>
<td>I often think that I should cut down on the amount of game that I play</td>
<td>0.77</td>
</tr>
<tr>
<td></td>
<td>I would be a lot more productive if I didn’t play so much game</td>
<td>0.89</td>
</tr>
<tr>
<td></td>
<td>I would spend more time with hobbies if I didn’t play so much game</td>
<td>0.87</td>
</tr>
</tbody>
</table>

Table 3. The description and reliability for dependent variables and independent variables.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>SD</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motivation to relax</td>
<td>5</td>
<td>34</td>
<td>20.22</td>
<td>5.94</td>
<td>0.82</td>
</tr>
<tr>
<td>Motivation to socialize</td>
<td>4</td>
<td>25</td>
<td>9.82</td>
<td>4.68</td>
<td>0.80</td>
</tr>
<tr>
<td>Motivation to escape</td>
<td>4</td>
<td>28</td>
<td>14.7</td>
<td>5.07</td>
<td>0.73</td>
</tr>
<tr>
<td>Motivation to achieve</td>
<td>5</td>
<td>35</td>
<td>18.54</td>
<td>7.95</td>
<td>0.91</td>
</tr>
<tr>
<td>Avatar-self identification</td>
<td>5</td>
<td>32</td>
<td>13.57</td>
<td>6.62</td>
<td>0.87</td>
</tr>
<tr>
<td>GAD_Problems and salience</td>
<td>10</td>
<td>67</td>
<td>24.37</td>
<td>12.83</td>
<td>0.95</td>
</tr>
<tr>
<td>GAD_Uncontrollable play</td>
<td>5</td>
<td>35</td>
<td>19.06</td>
<td>8.31</td>
<td>0.92</td>
</tr>
</tbody>
</table>
examined the relationships between motivations and avatar-self identification and the link between avatar-self identification and the symptoms of game addiction. The indices of model fitness show that model 2 fitted the data well (Chi-square = 2.53, df = 1, RMSEA = 0.08, CFI = 0.99, NNFI = 0.95, SRMR = 0.01). Model 2 was retained. Figure 1 and Table 5 present the results of the second model.

As shown in Figure 1 and Table 5, avatar-self identification was positively related to the two symptoms of online game addiction, implying that the more people identify with the avatars, the more likely they would suffer from problems caused by online gaming, view online games as an important part of their lives, lose the control of playing time. H1 was supported.

Table 4. The correlation matrix of the independent variables and the dependent variables.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motivation to relax</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motivation to socialize</td>
<td>0.42</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motivation to escape</td>
<td>0.57</td>
<td>0.44</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motivation to achieve</td>
<td>0.57</td>
<td>0.40</td>
<td>0.52</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avatar-self identification</td>
<td>0.41</td>
<td>0.50</td>
<td>0.54</td>
<td>0.50</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GAD_Problems and salience</td>
<td>0.31</td>
<td>0.30</td>
<td>0.32</td>
<td>0.41</td>
<td>0.41</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>GAD_Uncontrollable play</td>
<td>0.23</td>
<td>0.11</td>
<td>0.24</td>
<td>0.39</td>
<td>0.25</td>
<td>0.63</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Figure 1. The indirect effects of gaming motivations on game addiction through the mediation of avatar-self identification.
Chi-square = 2.53, df = 1, RMSEA = 0.08, CFI = 0.99, NNFI = 0.95, SRMR = 0.01.
Note: Only significant links are remained in the figure.
*p < 0.05; **p < 0.001.
Table 5. The coefficients and standard errors of the path model (completely standard solution).

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Avatar-self identification</th>
<th>GAD_Problems and salience</th>
<th>GAD_Uncontrollable play</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beta</td>
<td>SE</td>
<td>Beta</td>
</tr>
<tr>
<td>Motivation to relax</td>
<td>0.48*</td>
<td>0.07</td>
<td>0.12 n.s.</td>
</tr>
<tr>
<td>Motivation to socialize</td>
<td>0.15*</td>
<td>0.07</td>
<td>0.34*</td>
</tr>
<tr>
<td>Motivation to escape</td>
<td>0.09 n.s.</td>
<td>0.08</td>
<td>0.16*</td>
</tr>
<tr>
<td>Motivation to achieve</td>
<td>−0.05 n.s.</td>
<td>0.07</td>
<td>−0.17*</td>
</tr>
<tr>
<td>Avatar-self identification</td>
<td>0.20*</td>
<td>0.07</td>
<td>0.36**</td>
</tr>
</tbody>
</table>

*p < 0.01; **p < 0.001.
The motivation to relax was positively associated with avatar-self identification. It was also significantly related to uncontrollable play, but not to problems and salience. Players’ motivation to socialize was positively linked to avatar-self identification, problems/salience as well as an inability to control playing time, indicating both significant direct and indirect effects of the social motivation on online game addiction. The relationship between the motivation of escapism and avatar-self identification was not significant, and neither was the link between escapism and uncontrollable play. However, escapism was found to be significantly associated with problems and salience. Finally, the motivation to achieve was not significantly related to the perception of avatar-self identification or unmanageable play, but it was significantly related to problems and salience.

Discussion

Scholars have reached the consensus that understanding how human gamers interact and identify with their in-game avatars should be a central concern to the study of gaming behavior and the consequence of gaming (Bowman et al., 2012; Lewis et al., 2008). Supporting this view, our study finds a significantly positive effect of avatar-self identification on the symptoms of game addiction. Similarity identification decreases the social distance between the player and his/her avatar; wishful identity helps to bridge the gap between actual self and ideal self. As a player perceives the avatar to be a representation or an idealization of self-identity, he/she would care about the destiny of the avatar in the virtual world. In order to make a living in the cyberspace, a player needs to dedicate considerable time, energy, and even money to the development of his/her avatar, as a result, a strong feeling of emotional attachment will be made to the avatars, which increases the likelihood of game addiction.

This study also found that different gaming motivations were associated with different levels of avatar-self identification, and subsequently leading to different levels of game addiction symptoms. The motivation to play online games for enjoyment and relaxation led to the difficulty of controlling gaming time, but it was not significantly related to the symptom of problems and salience. This finding could be explained by the play theory proposed by William Stephenson (1988). Sometime the consumption of media is not necessarily goal-driven, but merely for pleasure. Entertainment gamers play the games without any expectation for any reward. They do not care about achievements and/or wealth gained in the virtual world; neither do they take the virtual relationships seriously. It is possible that entertainment gamers do spend a lot of time playing games for pleasure, but they can distinguish game and real life very well, hence they are too rational to be affected by the games. To these players, a game is a game and reality is reality, therefore they do not allow online games to displace the important things in their real lives and they are relatively immune to the symptom of game addiction. Another interesting finding is that motivation for entertainment is positively related to avatar-self identification. A possible explanation is that intimate attachment to the virtual character would make the gaming experience more appealing and enjoyable. As Grodal (2000) suggested, the interactive experience offered by electronic games would enable players to control human-like avatars to level up and make meaningful social relationships, therefore players can feel a strong sense of effectance and control, which initiates a constant sense of enjoyment (Hartmann & Klimmt, 2006).
We found that motivation to socialize in online games had a direct effect on game addiction as well as through the mediation of avatar-self identification. Most online games encourage social interactions among gamers by supporting collective play (Zhong, 2011) and virtual communities. The fundamental goal of social gamers is to enjoy the rich social life in online games. Therefore, they tend to take active part in collective activities and engage in dense social interactions. Because social interactions among gamers are mediated by their avatars, social gamers are likely to perceive stronger avatar-self identification. Furthermore, the presence and attention of other players in online gaming communities would provide social reinforcement for social gamers, and encourage them to become more and more socially active by playing the game longer and more frequently (Charlton & Danforth, 2004). As the socializers are absorbed in online social relationships, the time spending with offline social ties will decrease or be displaced, thus they are likely to suffer great social pressure from their offline social networks, that is why the motivation for socialization is positively related to the symptom of problem/salience.

The motivation to escape from the real world was found to exert direct effects on the addiction symptom of problems and salience, but its effects on avatar-self identification and uncontrollable play were not significant. The escape theory (Baumeister, 1991) explained that when people encounter with failure, setbacks or stress, they are likely to cope with the uncomfortable state by escaping into a relatively numb state of cognitive deconstruction (Baumeister, 1990). Blumler and Gurevitch (1974) noted that mass media could serve the purpose of distraction effectively because they create a dreamlike world to substitute people's gratifications, the consequence of which is further withdrawal from the physical world. Empirically, Lee and Shin (2004) found that Korean teenagers tried to escape from the stress caused by keen competition in study; playing online games and engage in avatar consumption were useful approach to reduce their stress and relax. The fantasy world of online games may temporarily take the person's mind off of their problems in the real world, but the escapist will eventually have to face the mundane aspects of real life after logging out from the games; the gap between the fantastic cyberspace and the problematic real world may strengthen the feeling of depression. Furthermore, lingering in the game world, rather than seeking to solve the problem, may be seen as an irresponsible behavior by escapist's social networks. Therefore, escapist may suffer from serious troubles and salience. Online games provide multiple choices for escapist to withdraw from the real world, they may not necessarily feel attached with avatars. Once there is an alternative way to evade the unpleasant experience in the physical world or the trouble is solved, escapist may leave online games soon. The above reasoning may explain why the motivation for escapism is not significantly associated with avatar-self identification or uncontrollable play.

Finally, a drive to seek personal achievement in the cyberspace was found to have a direct negative influence on problems and salience. However, the expected link between achievement and avatar-self identification and the relationship connecting achievement and uncontrollable play were not significant. These results were somewhat unexpected. A possible explanation is that the accomplishment in online games may be used as a reason that achievement-oriented gamers could argue with their family or friends about the justification of gameplay. Another possibility is that some achievement-oriented gamers may depend on the virtual trade system to progress in online games. They could purchase weapons, equipments, and even an ID ranked...
higher than their original ID, without doing endless tasks. However, future studies need to take a closer look at the mentality and behavior of achievement-oriented gamers.

Conclusion and limitation
The purpose of this study is to examine gaming motivations and avatar-self as important mechanisms leading to game addiction. The study tests the direct effect of motivations on game addiction and the mediation role of avatar-self identification accounting for the link between motivations and game addiction. The motivation to use a specific medium is a consequential factor to understand media effects (David, 2009). Our study finds that people play online games for various reasons, and different motivations have different effects on the symptoms of online game addiction. Understanding why people play online games and which types of motivations are linked to the overuse of games would make it possible to give early warnings for game addiction. What is more, understanding the magnetic motivational appeal of online games would also allow for more effective educational or health interventions (Przybylski, Rigby, & Ryan, 2010).

This study also examines the influence of gaming motivations on how players would identify with their avatars. Avatar-self identification is an important factor that contributes to online game enjoyment because manipulating the performance of an avatar would produce a sense of being in charge and give rise to a pleasure of control (Klimmt, Hartmann, & Frey, 2007). Our study found that avatar-self identification served as a mediator between gaming motivation and symptoms of game addiction. On the one hand, one’s motivation to relax and socialize enhanced their feeling of avatar-self identification. On the other hand, a close avatar-self identification will stimulate gamers to devote more time, cognition, and emotion to the development of avatars, thereby raise the risk of online game addiction.

The major limitation of this study is its nonrandom sample. It is difficult for researchers to apply random sampling method when studying online game players because the players are anonymously distributed in every corner of the world. The lack of a sampling frame makes it impractical to conduct a random sampling procedure. Most existed game studies used convenient samples through snowball sampling or self-selection. However, a convenient sample can hardly represent the population of online gamers. A lot of studies (e.g. Griffiths et al., 2004; iResearch.com, 2008; Yee, 2006a) have shown that the majority of online game players are males; however, the sample of this study contained too many females (44.7%). Furthermore, most of the samples of this study were ordinary users of online games and did not show very serious symptom of game addiction. Future study may want to test the relationship between gaming motivations, avatar-self identification and game addiction with more representative sample and compare how ordinary users and seriously addicted users differ in the abovementioned relationships.

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References
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