

# An Influence of Game Avatar on Real World



Jae Won Choi

**Abstract:** *The aim of this study is to examine the influence of gamers' avatar self-identification in massively multiplayer online role playing game (MMORPG) play on their real lives. By proposing the concepts of avatar self-identification, this study explores a model that develops the antecedents of avatar self-identification and the role in influencing gamers' real lives. For empirical analysis, this study gathered data from 228 university students in South Korean by a survey method and analyzes the data with AMOS 24. The results show as follows. First, social interaction and social support that gamers perceive in MMORPGs increase their avatar self-identification. Second, the gamers' avatar self-identification increases their social capital and self-esteem in real lives. Finally, social interaction that gamers perceive in MMORPGs increases their social capital in real lives through their avatar self-identification. And, social support that gamers perceive in MMORPGs increases their self-esteem in real lives through their avatar self-identification. The research contribution on game research is to pay scholarly attention to the positive effect of MMORPGs in the perspective of avatar self-identification.*

**Keyword:** *Massively multiplayer online role playing games; Avatar self-identification; Social interaction; Social support; social capital; Self-esteem*

## I. INTRODUCTION

Nearly two-thirds (65 percent) of households in USA enjoy video of computer games, and 51 percent of American households own dedicated video game consoles [1]. By 2013, the video game industry had sold \$21.5 billion in total game hardware, accessories, and content [2]. The phenomenal growth of video games over the past two decades reflects the growing ubiquitous and diverse nature of video game players. However, research concerning the mental states of video game players has warranted mixed results. Video games are related to positive social benefits such as computer skills acquisition, cognitive and attentional skill improvements, positive technological attitudes and perceptions, and increased marketability to technological fields. On the other hand, a lot of the empirical study on the combined influences of games focus primarily on the correlation between video games with violence and behaviors with aggressiveness. The General Aggression Model [3] suggests a theoretical framework to study relationships between enjoying violent video games, aggressive personality, and attendant aggressive behaviors.

**Revised Manuscript Received on October 30, 2019.**

\* Correspondence Author

Jae Won Choi\*, College of software, Chungang University, Heugseoglo 84, Dongjaggu, Seoul, Korea, E-mail: ch000523@naver.com.

© The Authors. Published by Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP). This is an [open access](https://creativecommons.org/licenses/by-nc-nd/4.0/) article under the CC-BY-NC-ND license <http://creativecommons.org/licenses/by-nc-nd/4.0/>

In order to verify the correlation between the consumption of violent media and the accompanying violent aggression, the General Aggression Model (GAM) suggests that short term effects include an increase in arousal and aggressive states by priming aggressive cognitions.

In particular, massively multiplayer online role playing games (MMORPG) is a kind of video game which individuals play via the Internet. MMORPG is different from the video games which single-gamer plays. Since MMORPG gamers can play games with thousands of other gamers, MMORPGs offer gamers individually designed avatars for online access and socialization [4]. Relevant researches have suggested that MMORPG gamers tend to create avatars that are more like ideal egos than actual egos [5]. Gamers gain knowledge, skills, and necessary resources from their avatars, which give the overall meaning of each value and often transcend the game [5]. Also, MMORPGs allow individuals to play games with other participants by allowing them to develop and maintain a online world. The World of Warcraft (WoW) environment, the production, and development of avatars, and the ties with other gamers require considerable effort and time [4]. In turn, a lot of gamers get attached to avatars emotionally [5].

Given the circumstances in which a mixture of studies on the mental state of video gamers warrant results, the study explores the role of gamers' avatar self-identification in MMORPG play on their real lives. To this end, the study conducts in two stages. First, this study examines the research based on the effect of avatar self-identification on MMORPG play. Also, this study suggests and assumes how the antecedents of gamers' avatar self-identification in the MMORPG environment and avatar self-identification affect their attitudes. Second, this study verifies the assumed relationship in the theoretical model and reply the research question. Third, it discusses the results, provides theoretical contribution and practical effect on the effect of the avatar self-identification on the real-life of gamers in MMORPG, and explains research restrictions and directions for future research.

## II. THEORY AND HYPOTHESIS

### A. Avatar Self-Identification

According to some researches [4], MMORPG creates an interactive environment and provides an ideal gateway for creating emotional relationships and lifelong friendships. Gamers naturally switch their unique self-awareness by identifying the roles in the online world [4].

Character identification creates a strong appeal for the consumption of media [6]. There are two categories of avatars in game research [7]. One type of avatar is an attempt to project or idealize its identity. Also, the second category is a try to provide a new identity. Van Looy et al. [6] says the gamer prefers different types of identification for different reasons. Lim and Rees [8] pointed out that identifying similarities reduces the psychological distance between human gamers and avatars and increases the game's self-association.

Conversely, with hopeful identification, gamers can use avatars to connect the gap between real and ideal ego. Some of online gamers have pointed out that Van Looy et al. [6] can indulge in more in the online world. The degree to which a gamer identifies an avatar can indicate the degree to which he or she views it as part of her. Therefore, the strength of avatar self-identification can be influenced by its identification as an ideal ego, not by its actual ego.

According to Dunn and Guadagno [9], in general, people prefer to make avatars which are gender-related and help with avatars. However, people who have properties at the undesirable purpose of the spectrum of personality, including low tolerance, nervousness, or self-esteem, prefer to utilize avatars to overcome their shortcomings. Bessiere, Sey, and Kiesler [5] argued that the gamer identified significant differences between high and low when evaluating his or her self-esteem. However, there was mainly no difference in the gamer's perception of an avatar's self-esteem. Gamers with high self-esteem and low self-esteem rated ideal ego higher than actual ego. This MMORPG gamer tends to evaluate avatars between the ideal and the real self [9].

Unlike Lim and Reves [8], Smahel, Blinka, and Ledabyl [11] argued those who regard their avatar as more conspicuous than their real self could display more significant avatar self-identification. It allows the gamer to devote more time and emotion to avatar development. In the online world, an avatar's success tends to be essential for gamers who think they perceive their avatar as an expression or idealization of their identity. As a result, the gamer gets emotionally attached to avatar while making an online world in the game [4]. This allows the gamer to build avatars and authoritative links, so the gamer can feel like it's an avatar [4]. Yee [7] appreciates the story-telling capabilities of the MMORPG online world and enjoys creating background stories for avatars related to game stories.

### B. Hypothesis development

Presence is defined in various ways throughout the literature. However, Tamborini and Bowman [11] defined it as the psychological state in which an online object is experienced as a real object in a sensuous or non-sensory manner. This essentially means that when people experience presence, they feel as if they can communicate with objects. A presence is different from a narrative enemy participation in a presence that, in particular, deals with a person's interaction with an online world, such as MMORPG, rather than a person's involvement in a narrative environment [12]. MMORPG provides the setting that allows a lot of users to voluntarily commit themselves in an online world and make much interaction with each other using avatars every day. Yee

[7] noted that he has conducted studies on MMORPG and allows for new types of social interaction and social identity.

The relevant researchers suggested that the level of online interaction with improved social presence arises [11]. Especially, Lee [12] argues that social beings should add a new level of awareness to interactions by users, by differentiating interactions from social beings. In short, there is a social presence when the user is aware of it. Social presence has a feeling that other social in the online environment closely mimic the real social actors [12]. Traditional narratives do not see a variety of types of presence, but video game studies show that a presence experience anticipates changes in enjoyment, attitudes and behavior in both narratives. In MMORPG, the social interactions between gamers and others increase social presence and positively affect the identification of avatars themselves. Therefore, social interactions in MMORPG are expected to be positively related to avatar self-identification.

H1: Social interaction that gamers experience in MMORPGs will be positively related to their avatar self-identification.

Escapism is a strong antecedent of welfare reduction among MMORPG gamers [13]. To date, the study of mechanisms that describe the harmful effects of MMORPG escape is primarily related to specific factors that are examined individually. Since the availability of perceived support improves positive human emotions, it is one of the most fundamental pioneers of well-being and the individual receiving social support thinks they care, respect, and value themselves.

The research of the social environment in MMORPGs has help to better understand the structural factors of social support. Observations show that other gamers can behave as potential support agents in addition to traditional support providers (spouses/partners, friends, caregivers, etc.) [7]. But researchers did not investigate the effect of online social support on the problem that escapist faced (i.e., trying to escape from the real world). Related studies show that social support from other gamers in MMORPG can increase their perceived well-being. The online world in MMORPG provides an opportunity to improve the gamer's social identity [7]. When gamers play MMORPGs through their avatar, those who receive more social support from other gamers feel more fledging and positively affect the identification of the avatar. Therefore, social supports in MMORPG are expected to be positively related to avatar self-identification.

H2: Social supports that gamers experience in MMORPGs will be positively related to their avatar self-identification.

According to Zhong and Yao [14], avatar is closely related to the self-sense of online gamers. Social gamers prefer to be dynamic in their collective activities in their online worlds. These kinds of social interactions are mediated through avatars and can recognize the secure identification of avatars themselves. Avatar-based collaboration within MMORPG helps reduce CMC's distrust, and makes a new bond that connects social capital.

Also, this satisfactory collaboration in MMORPG makes a comrade within the same environment, creating a robust social relationship that represents the bond of social capital. Besides, Putnam [15] pointed out Internet could reverse the decline in social capital and the gamer made various forms of social networks with established norms, rules, and boundaries. Social capital must have been created in making these social networks. Therefore, this study demonstrates that strong avatar self-identification is positively linked to the social capital of MMORPG gamers in the real world. Therefore, this study proposes the following hypothesis.

H3: The avatar self-identification of MMORPG gamers will be positively related to their social capital in the real world.

Sedikides and Strube [16] have suggested that the degree of self-esteem that a person feels can be magnified as a direct outcome of self-improvement or as an indirect outcome of self-improvement. Bessiere, Seay and Kiesler [5] suggested that many gamers can use their avatars for breathing life into some aspects of their ideal self, thereby providing positive benefits for low-esteem users. Also, Dunn and Guadagno [9] found some of the world's worst-performing online gamers complemented by some of the world's low self-esteem. Based on this reasoning, low self-esteem gamers who play MMORPG show that self-identification of avatars increases self-esteem by making avatars that they think are superior to the real self. Therefore, this study proposes the following hypothesis.

H4: The avatar self-identification of MMORPG gamers will be positively related to their self-esteem in the real world.

### III. METHODOLOGY

#### A. Sample

Samples from this study consist of 228 college students who have participated in MMORPG in Korea. The sample consists of undergraduate and graduate students from engineering, social science, and business majors. Research participation criteria include past MMORPG participation and minimum age of 18. Samples are considered one of the convenience, but college students represent an important subset of the key participant segments focused on by MMORPG marketing personnel.

The response was analyzed to identify the response set before measuring the validation and model tests [17]. Response sets tend to answer questions in a specific way [17], regardless of the topic. No response set case found. Two tests were used for typical method variances. Firstly, Harman's single-factor test of common methods was a satisfactory result. Additional tests for partial correlations were also carried out [18]. The procedure specifies the first element of significant component analysis is used as a control variable in the Partial Least Squares (PLS) model. This is based on the assumption that the first element is closest to the common method variance (CMV) (if bias is present). It is assumed that CMV exists when factors cause variance [18]. The variances described as expected have not changed much. Therefore, it is not a problem with general method bias.

#### B. Data and measurement

This study includes measurements of five potential structures, such as social interaction, social support, avatar self-identification, social capital and self-esteem. More specifically, "social interaction" was measured in four categories that Lucas and Sherry [19] developed. "Social support" was measured in eight categories on the Berlin Social Support Scale, assessing tool enemy and emotional social support [20]. The "Avatar self-identification" was measured by modifying the selections found in the search element analysis found in previous WoW studies, such as Van Looy J., Courtois, De Vocht, and De Marez [6]. "Social capital" was measured in 20 categories by modifying the existing Internet Social Capital Scale (ISCS) and by modifying the Interpersonal Support Assessment List (ISEL) [21]. An expression that reflects the context of this study. "Self-esteem" was measured using 10 items on the Rosenberg Self-Esteem Scale [22].

### IV. RESULT

Evaluating the reliability and validity of the measured values before the hypothesis test [23]. A component-based approach to structural equation modeling was used because the model included a formative configuration.

#### A. Analysis of reflective measures

This study conducted tests to assess the convergence, identifiable validity and reliability of the reflection measurements. Convergence validation was set up using elements to get started. For each factor, a load greater than 0.70 is interpreted to have a converging effect [24]. This study also used second indicator of convergence. For each configuration, a value greater than 0.50 in mean variance extraction (AVE) is assumed to indicate sufficient convergence. The test results indicate that both conditions have been met.

If the square root of the AVE is higher than the correlation between the structures, the judgment is verified [24]. The square root AVE for avatar self-identification, social capital, and self-esteem is 0.7499, 0.7501 and 0.7625. A second test of discriminatory validity assumes that each item has a higher load in the configuration than any other potential variable [23]. Therefore, the measured values have sufficient discriminative validity. To establish stability, this study checked for internal consistency measurements for each configuration to achieve stability. A structure exceeding 0.70 is considered to have sufficient reliability [25].

#### B. Analysis of formative measures

This study conducted alternative tests of validity and reliability for formative constructs such as social interaction and social support. Loch et al. [26] showed the correlation pattern between factors and potential variables in the modified multi-trait multi-method (MTMM) matrix to assess convergence and discriminative validity.



Convergence adequacy is evaluated through examination of item configuration correlation [27]. Convergence validation is demonstrated when an item is loaded to that syntax. The results indicate that with the exception of six indicators, the weight of the item is significant at the 0.05 significance level. Six additional non-critical items were analyzed according to the prescription to interpret the measured configuration results [28].

A prescription differentiates the relative and absolute contribution of indicators to the metric [28]. Relative contributions are the relationships between parameters and criteria while keeping other predictors constant. The importance of measurement items in the same configuration compared to other measurement items. The total contribution is the relationship between metrics and criteria, ignoring other predictors. In some cases, both perspectives should be considered to understand the effects of indicators better. For example, an indicator can have relatively unimportant contributions to a crop offering. Nevertheless, there can still be an absolute essential contribution. Therefore, if the relative contribution is low, absolute contribution should also be considered.

This research shows, five items have a relatively low contribution, so you should consider a unique relationship with the relevant configuration. The total contribution to the five items is important. The values are 0.733, 0.745, 0.718, 0.732 and 0.729, respectively. Thus, the contribution of the indicators is relatively low compared to other indicators, but there is a strong and unusual volume relationship with each configuration [29]. Also, there were no patterns in wording, polarity, or content between the topics describing the differences, and no conceptual problems with a structural definition. Therefore, it was decided that the item was not theoretically justifiable and should be maintained, rather than removing it and abandoning it and changing the meaning of the structure. Finally, evidence of legality is presented when an item is more correlated with each other's configuration measurement value than with the other configuration measurement value [30].

**C. Structural modeling**

Since the model consisted of reflective and constructed structures, this study used boot strap sampling in order to test the proposed relationship between the structures [23]. This procedure obtained the path coefficients and t-values and is described in Table 1. The results show that social interaction ( $\beta = 0.3291, p < 0.05$ ), social support ( $\beta = 0.2332, p < 0.05$ ) influenced avatar self-identification. H1 and H2 were supported. Avatar self-identification influenced social capital ( $\beta = 0.2155, p < 0.05$ ) and self-esteem ( $\beta = 0.2273, p < 0.05$ ). H3 and H4 were supported.

**Table I: Path coefficients and their t-values**

Hypothesis	Path coefficient( $\beta$ )	t-value	Significance	Outcome
H 1	0.3291	2.734	$p < 0.050$	Supported
H 2	0.2332	2.536	$p < 0.050$	Supported
H 3	0.2155	2.226	$p < 0.050$	Supported
H 4	0.2273	2.542	$p < 0.050$	Supported

To make sure that avatar self-identification has mediating effect on the relationship between each of antecedents of

avatar self-identification and each of consequences of avatar self-identification, this study followed Baron & Kenny's [30] steps. Regarding social capital, first, social interaction ( $\beta = 0.3327, p < 0.05$ ) and social support ( $\beta = 0.2731, p < 0.05$ ) were positively related to social capital. Second, in Table 1, each was shown to positively influence avatar self-identification. And, avatar self-identification was shown to positively influence social capital. Finally, social interaction, social support, and avatar self-identification were introduced into the model. The coefficients of social interaction ( $\beta = 0.2912, p < 0.05$ ) decreased, while social support was insignificant. As shown in Table 2, there is empirical verification to conclude that avatar self-identification has mediating effect on the relationship between social interaction and social capital. Regarding self-esteem, first, social interaction ( $\beta = 0.2227, p < 0.05$ ) and social support ( $\beta = 0.2241, p < 0.05$ ) were positively associated with self-esteem. Second, in Table 1, each was shown to be positively related to avatar self-identification. And avatar self-identification was shown to be positively related to self-esteem. Finally, social interaction, social support, and avatar self-identification were entered into the model. The coefficients of social support ( $\beta = 0.1570, p < 0.05$ ) decreased, while social capital was statistically insignificant. Therefore, in Table 2, there is verification to show that avatar self-identification mediates the relationship between social support and self-esteem.

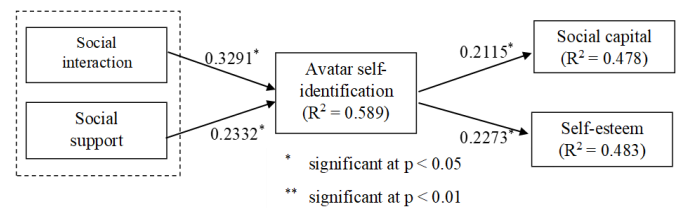
**Table II: Testing mediation effects of Avatar self-identification**

	Dependent variable s: Self-esteem	Dependent variable s: Avatar self-identification	Dependent variables : Self-esteem (Avatar self-identification included)
Social interaction	$\beta = 0.2227, p < 0.05$	$\beta = 0.2115, p < 0.05$	$\beta = 0.2881, p = 0.17$
Social support	$\beta = 0.2241, p < 0.05$	$\beta = 0.2273, p < 0.05$	$\beta = 0.1570, p = 0.02$

	Dependent variable s: Social capital	Dependent variable s: Avatar self-identification	Dependent variables : Social capital (Avatar self-identification included)
Social interaction	$\beta = 0.3327, p < 0.05$	$\beta = 0.3291, p < 0.05$	$\beta = 0.2912, p < 0.05$
Social support	$\beta = 0.2001, p < 0.05$	$\beta = 0.2332, p < 0.05$	$\beta = 0.2116, p = 0.18$

The model's explanatory forces were taken into account in observing R2 of the endogenous structure [31]. In Figure 1, this model represents 58.9% of avatar self-identification, 47.8% of social capital, and 48.3% of self-esteem. All hypotheses are supported. Finally, a few elements have been used as controls. This study included age and gender. Age was shown to be significant ( $\beta = 0.1363, p < 0.05$ ).



**Figure I. Results**

## V. CONCLUSION

### A. Discussion

It is suggested exploring the relationship between MMORPG gamers and avatars and how these relationships affect gamers in real world. Also, given the characteristics of MMORPG, this study identified two antecedents of avatar self-identification and explored how the antecedent of avatar self-identification affects avatar self-identification and social capital in their real lives. Three hypotheses were tested by gamers who regularly perform MMORPGs using questionnaires, modeled on the validated designs of previous researchers [21]. As a result, the social interaction and social support that gamers perceive in MMORPGs increase Avatar's self-identification. Because avatars function as humans in online environments to enable communication in online environments, MMORPG gamers strongly recognized stronger social interactions in this study. This can indicate that the more social interaction online gamers perceive, the better they are identified with avatars. And, since the online world in MMORPG provides an opportunity to improve the gamer's social identity through their avatar [7], those who receive more social support from other gamers feel more fledging and positively affect the identification of the avatar.

Second, the gamers' avatar self-identification increases their social capital and self-esteem in real lives. MMORPG has been gaining popularity for many years and is striving to defeat an online enemy as individuals of all ages and backgrounds network, form a social network, and become a common gathering place worldwide. Individuals play online games for many reasons. But, one of the common thing that these gamers have is a link to the online world through their avatar. Their avatar means who they are the agents of all interactions in the online world. The degree to which a person identifies an avatar varies and affects the results of the MMORPG experience. These online relationships are no different from real relationships, and it is natural for individuals to find links that can raise their self-esteem and increase social capital.

Additionally, this study explored the mediating role of avatar self-identification in the effect of social interaction and social support of the gamers in MMORPG on social capital and self-esteem in their real lives. In the results, social interaction that gamers perceive in MMORPGs increases their social capital in real lives through their avatar self-identification. The results show that when the gamers experience more social interaction in MMORPGs, they perceive more avatar self-identification and, in turn, they can get more social capital in their lives than they can feel self-esteem in their lives. In the context of MMORPGs, the avatar self-identification of gamers is verified to mediate between social interaction and social capital. And, social support that gamers perceive in MMORPGs increases their self-esteem in real lives through their avatar self-identification. The correlation between social support and self-esteem has been examined over time [13]. In the context of MMORPGs, the avatar self-identification of gamers is verified to mediate between social support and self-esteem.

### B. Research contributions and practical implications

This research shows a significant theoretical contribution. First contribution of this study is to show its evidence to investigate the relationship between the avatar self-identification of gamers in MMORPGs and their real lives. Empirical evidence of these results of this study help to understand the influence of avatar self-identification in MMORPGs on the real lives of gamers and complements the increase in knowledge in this field. Second, the gap of research which this study addressed is that the nature of avatar self-identification is not clear and the role of influencing the real lives of gamers in MMORPGs cannot be modeled. To solve this problem, this study explicitly presents avatar self-identification as a essential concept that affets the real lives of gamers in MMORPGs. This study identifies the applicability of avatar self-identification in game studies to account for gamer psychological and behavioral responses. The avatar self-identification theory emphasizes attachment with the target, but in game researches, the gamers' experience has been not considered. This study opened a new chapter in understanding meaningful attachment from an avatar self-identification perspective. This study is the first one to explore the effect of avatar self-identification in MMORPGs and incorporate avatar self-identification into the real life model. By empirically demonstrating that avatar self-identification is regarded as important concept that influences the real lives of gamers, this study complements existing concepts to promote a good effect of MMORPGs.

This study also provides essential management implications. First, game companies should understand avatar self-identification to drive gamers' well-being in their real lives. Second, the results suggest that game companies should pay their attention to social interaction and social support in MMORPGs to promote the well-being of gamers through avatar self-identification. Studies show that when game companies understand these avatar self-identification attributes, they are more likely to promote their well-being lives. Finally, the results of this study show some implications on companies looking for new ways to improve gamers' intent. It is worthy that avatar self-identification can be an impotent factor in forecasting gamers' intention to play.

### C. Limitations and future research directions

Although this study helps to understand of the impact of avatar self-identification on the real world, but there are some limitations to this study on the likelihood of generalization. First, these results cannot be generalized to different environments. Since few studies are conducted on this topic, the generalization of results can depend on verification in other areas. Second, since the study has 86.3% of all respondents, the abrasion level is 13.7% compared to the abrasion level of up to 10% permitted in social science. Therefore, an expectation of 3.7% or more may negatively affect the validity of the study results.

There are several paths to this study's extensions in the future. First, if they are replicated and verified in different regions and environments, these results can be generalized.

This study recommends that other developing countries use the same model for future research. Second, this study used the survey methodology for data collection. Future researchers need to try to time series analysis to overcome the causal relationship between avatar self-identification and gamers' real life.

### REFERENCES

1. Entertainment Software Association. (2014). Essential facts about the computer and video game industry. Retrieved from [http://www.theesa.com/facts/pdfs/esa\\_ef\\_2008.pdf](http://www.theesa.com/facts/pdfs/esa_ef_2008.pdf)
2. NPD. (2014). Research Shows \$15.39 Billion Spent On Video Game Content In The US In 2013, A 1 Percent Increase Over 2012. Retrieved from <https://www.npd.com/wps/portal/npd/us/news/press-releases/research-shows-15.39-billion-dollars-spent-on-video-game-content-in-the-us-in-2013-a-1-percent-increase-over-2012/>
3. Bushman, B. J., & Anderson, C. A. (2002). Violent video games and hostile expectations: A test of the General Aggression Model. *Personality and Social Psychology Bulletin*, 28(12), 1679-1686.
4. Gabbiadini, A., Mari, S., Volpato, C., & Monaci, M. G. (2014). Identification Processes in Online Groups: Identity Motives in the Virtual Realm of MMORPGs. *Journal of Media Psychology*, 26(3), 141-152.
5. Bessiere, K., Seay, A. F., & Kiesler, S. (2007). The ideal elf: Identity exploration in world of warcraft. *CyberPsychology & Behavior*, 10(4), 530-535.
6. Van Looy, J., Courtois, C., De Vocht, M., & De Marez, L. (2012). Player identification in online games: Validation of a scale for measuring identification in MMOGs. *Media Psychology*, 15, 197-221.
7. Yee, N. (2006). The demographics, motivations and derived experiences of users of massively multiuser online graphical environments. *Presence*, 15, 309-329.
8. Lim, S., & Reeves, B. (2009). Being in the game: Effects of avatar choice and point of view on psychophysiological responses during play. *Media Psychology*, 12, 348-370.
9. Dunn, R., & Guadagno, R. (2011). My avatar and me - Gender and personality predictors of avatar-self discrepancy (English). *Computers In Human Behavior*, 28(1), 97-106.
10. Smahel, D., Blinka, L., & Ledabyl, O. (2008). Playing MMORPGs: Connections between addiction and identifying with a character. *CyberPsychology & Behavior*, 11, 715-718.
11. Tamborini, R., & Bowman N. D. (2010). Presence in video games. In Bracken CC, Skalski P, eds. *Immersed in media: telepresence in everyday life*. New York: Routledge, pp. 87-109.
12. Lee, K M. (2004). Presence, explicated. *Communication Theory*, 14, 27-50.
13. Hoffman, M. A., Ushpiz, V., & Levy-Shiff, R. (1988). Social support and self-esteem in adolescence. *Journal of Youth and Adolescence*, 17(4), 307-316.
14. Zhong, Z., & Yao, M. (2013). Gaming motivations, avatar-self identification and symptoms of online game addiction., 23(5), *Asian Journal of Communication*, 23(5), 555-573.
15. Putnam, R. (2000). *Bowling alone: The collapse and revival of American community*. New York: Simon & Schuster.
16. Sedikides, C., & Strube, M. J. (1997). Self-evaluation: To thine own self be good, to thine own self be sure, to thine own self be true, and to thine own self be better. *Advances in Experimental Social Psychology*, 29, 209-269.
17. Kerlinger, F. (1973), *Foundations of Behavioral Research* 2nd edn, London, UK: Holt Reinhart & Winston.
18. Podsakoff, P. M., & Organ, D. (1986). Self-reports in organizational research: problems and prospects, *Journal of Management*, 12(4), 531-544.
19. Lucas, K., & Sherry, J. L. (2004). Sex differences in video game play: A communication-based explanation. *Communication Research*, 31(5), 499-523.
20. Schulz U, & Schwarzer R. (2003). Soziale Unterstü'tzung bei der Krankheitsbewä'tigung: Die Berliner Social Support Skalen (BSSS). *Diagnostica*, 49, 73-82.
21. Williams, D. (2006). On and off the "net": Scales for social capital in an online era. *Journal of Computer-Mediated Communication*, 11(2), 593-628.
22. Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton: Princeton University Press.
23. Gefen, D., Rigdon, E. E., & Straub, D. (2011). An Update and Extension to SEM Guidelines for Administrative and Social Science Research. *MIS Quarterly*, 35(2), 3-14.
24. Henseler, J., Ringle, C. M., & Sarstedt, M. (2014). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43(1), 115-135.
25. Fornell, C. & Bookstein, F. (1982). Two structural equation models: LISREL and PLS applied to consumer exit-voice theory, *Journal of Marketing Research*, 19, 440-452.
26. Loch, K., Straub, D., & Kamel. S. (2003). Diffusing the internet in the Arab world: the role of social norms and technological culturation, *IEEE Transactions on Engineering Management*, 50(1), 45-64.
27. Chin, W. (1995). Partial least squares is to LISREL as principal components analysis is to common factor analysis. *Technology Studies*, 2, 315-319.
28. Cenfetelli, R., & G. Basselier. (2009). Interpretation of formative measurement in IS research, *MIS Quarterly*, 33(4), 689-707.
29. Nunnally, J. C., & Bernstein, I. H. (1984). *Psychometric Theory*. McGraw-Hill. New York.
30. Loch, K., Straub, D., & Kamel. S. (2003). Diffusing the internet in the Arab world: the role of social norms and technological culturation, *IEEE Transactions on Engineering Management*, 50(1), 45-64.
31. Baron, R., & Kenny, D. (1985). The moderator-mediator variable distinction in social psychological research: conceptual, strategic and statistical considerations. *Journal of Personality and Social Psychology*, 51(1), 1173-1182.
32. Chin, W. (1995). Partial least squares is to LISREL as principal components analysis is to common factor analysis. *Technology Studies*, 2, 315-319.

### AUTHORS PROFILE



**Jae Won Choi**, Divison of software, College of software, Chungang University, Seoul, The republic of Korea. My interests in studying are bloek chain, game, data science, artificial intelligence.