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ORIGINAL ARTICLE

Identification of Avatar Mediates the Associations Between Motivations of Gaming and Internet Gaming Disorder Among the Malaysian Youth

Soo Ting T'ng[1,2] · Kee Pau[2]

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Abstract
Multiplayer Online Battle Arena (MOBA) genre has been expanding rapidly in Malaysia. However, the nature of this genre is addictive. Research in the area of Internet gaming disorder (IGD) among gamers of this genre is relatively new, signifying a substantial literature gap to be filled. The aim of the present study was to examine the selected determinants (i.e., motivations of gaming and identification of avatar) of IGD among MOBA gamers. The mediating role of identification of avatar in the associations between motivations of gaming (i.e., achievement, socialization, and immersion) and IGD was also investigated. A total of 1175 gamers were recruited through MOBA online groups in social media. Males were accounted for 75.20% ($n = 808$) and aged between 18 and 29 ($M_{age} = 22.19$ years, SD = 3.30). The findings revealed that motivation of achievement, motivation of immersion, and identification of avatar positively predict IGD, whereas motivation of socialization negatively predicts IGD among MOBA gamers. Identification of avatar was found as a significant mediator of the relationships between motivations of gaming and IGD. A large effect size was found with a total of 45% of variances explained by each determinant in the study. Overall, the findings of the present study provided empirical evidence for the underlying determinants of IGD. Intensive collaboration from various parties should be established for diminishing the potential adverse impacts of IGD on youth nowadays.

Keywords Motivations of gaming · Identification of avatar · Internet gaming disorder · Youth

✉ Soo Ting T'ng
tngst@utar.edu.my

[1] Department of Psychology and Counselling Universiti Tunku Abdul Rahman (UTAR) Faculty of Art and Social Science (FAS), Jalan Universiti, Bandar Barat, 31900 Kampar, Perak, Malaysia

[2] Department of Psychology and Counselling Faculty of Human Development, Universiti Pendidikan Sultan Idris, 35900 Tanjung Malim, Perak, Malaysia

Playing video games has become one of the most popular leisure activities, particularly among adolescents and young adults. This activity is made even more popular after the introduction of massively multiplayer online games. The popularity of online games had attracted research interests in investigating the impacts of excessive gaming. Empirical studies (e.g., Bowman and Tamborini 2012; Green and Bavelier 2012; Moisala et al. 2017) reported that gaming produces several positive effects, including the improvement of cognitive functioning and mood regulation. However, excessive indulgence is also linked to poor sleep quality, low life satisfaction, attentional impulsivity, depression, and aggression (e.g., Altintas et al. 2019; Bargeron and Hormes 2017; Hasan et al. 2012; Ryu et al. 2018).

The introduction of IGD as a tentative mental disorder in the fifth edition of Diagnostic and Statistical Manual of Mental Disorder (DSM-5) by the American Psychiatric Association (APA 2013) has triggered numerous controversies by scholars (e.g., Aarseth et al. 2017; Kuss et al. 2017; Griffiths et al. 2016; Rumpf et al. 2018). Further, the World Health Organization (WHO) has recently recognized gaming disorder (GD) in the 11th revision of International Classification of Diseases (ICD-11; WHO 2019). For GD to be diagnosed, the behavioral patterns must have brought significant impairment to various life aspects such as personal, family, social, education, and occupation over 12 months.

The examination of psychological motivations of gaming reflects unique meaning and consequence for each gamer (Caplan et al. 2009). Gamers with different motivations produce different behavioral outcomes in the virtual world. As a result, some players will devote a large amount of time and effort in the development of their online character (avatar). These gamers would achieve desired goals, cope with challenges, modify game narratives, and socialize in the gaming world via their selected avatars. Many studies have investigated the interplay between motivations of gaming and gaming behaviors. However, Griffiths and Pontes (2019) argued that the examination between psychological motivations and gaming behavior should be continuously conducted as one of the foci on improving the quality of gaming research. The investigation of gamer-avatar relationship is also crucial in unveiling the psychological drive for their gaming behaviors and its role in the development of IGD (Lewis et al. 2008). Taken together, the present study aims to examine the contributory roles of motivations of gaming and identification of avatar in IGD.

Multiplayer Online Battle Arena

Kuss and Griffiths (2012) argued that not all gamers have equal chance to develop IGD given the diverse range of game genres available on the market. Genres with online features provide opportunity for gamers to compete and cooperate in attaining goals while socializing with each other (Lee et al. 2015). The online feature of the game reinforced gamers to devote a greater extent of commitment which may have interfered the daily functioning (Kuss et al. 2012). It is expected that games which provide a form of incremental progression are likely to reinforce gamers to play more, leading to the formation of IGD.

One of the recent popular genres, Multiplayer Online Battle Arena (MOBA), has not received adequate scholarly attention compared with massively multiplayer online role-playing games (MMORPGs) in the recent decade (e.g., Kardefelt-Winther 2014; Mancini et al. 2019; You et al. 2017). MMORPGs involve thousands or even millions of gamers on a shared platform and the virtual world continues to evolve when the gamer is logged out (Billieux et al. 2013). On the other hand, MOBA games are conducted with at least two

opposing teams and the virtual world is discontinued once the team has withdrawn from the gameplay. Team members collaborate in achieving complex and fast-paced tasks (i.e., conquer enemy base, kill enemies, and destroy buildings) while competing with a rival team (Sapienza et al. 2018). From another perspective, both genres require gamers to have constant social interaction and commitment in "leveling up."

Lately, MOBA genre has been expanding rapidly. Popular examples of the genre include *Defense of the Ancients 2* (DOTA 2), *League of Legends* (LoL), and *Mobile Legends*. An online platform for video game named Steam by Valve Corporation reported that DOTA 2 is one of the most played games with a huge number of active gamers (ranging from 630,000 to 1.05 million) daily throughout January to August 2019 (Steam Database 2019) worldwide. Despite the far-reaching popularity of MOBA, there is still an inadequate examination of this gaming genre. Hence, the present study aims to fill the literature gap.

Youth

In Malaysia, the population of Internet users has substantially increased from 24.1 million in 2016 to 28.7 million in 2018 out of 31 million of the total population. Approximately 13.8 million of them were youth who are actively involved in online gaming (Malaysian Communications and Multimedia Commission 2016, 2018). Malaysia was ranked 21st out of the top 100 countries in contributing US$633 million in revenue for digital games (Newzoo's Global Games Market Report 2018). The rapid growth of this activity signified the urgency to examine the determinants of IGD for establishing effective prevention and intervention strategies. The urgency to examine this age group has also been highlighted by APA (2013) in which an estimated 12 to 20% of IGD's prevalence accounted for emerging adults (aged between 18 and 25). It is expected that any addictive behaviors which were initiated during this period may continue its etiology over the remaining life course. Therefore, greater scholarly attention should be devoted to this vulnerable age group.

Motivations of Gaming

Motivation is an inner force that guides an individual to behave or to strive for anticipated outcomes (Wan and Chiou 2006). The examination of motivational sources among gamers is crucial in understanding IGD. Yee (2006) proposed achievement, socialization, and immersion as the three distinct sources of motivation in gaming.

According to Yee (2007), gamers who are motivated by achievement need exhibiting strong desire to rapidly progress in the virtual world, strong interest in understanding rules and mechanisms of the game, as well as challenging others to experience a state of superiority. In order to achieve their desired goals, gamers would be rewarded by devoting more resources to the game (King et al. 2017; Mat Sin et al. 2014). As if gamers are not satisfied with the outcomes of targeted goals, they feel uneasy to leave the goals unattained; hence, the gameplay becomes more intensive (Kaptsis et al. 2016). Therefore, achievement motivation had been reported as a positive correlate of problematic online gaming behavior (Kuss et al. 2012).

Gamers who are motivated by socialization need tend to have a strong interest in collaborating with other gamers, gain satisfaction by being part of a team's effort, and have a strong desire to seek and provide social support (Yee 2007). Positive emotions and strong sense of

connectedness will further encourage gamers to have more socialization (Godman 2013), subsequently reinforce gamers to have more frequent and longer duration of gameplay activities (Zhong and Yao 2013).

Despite the virtual social interaction, gamers are also found to be actively involved in game communities (e.g., guild) to experience a sense of companionship or belongingness (Caplan et al. 2009). However, inconsistent findings were reported in which social interaction contributes to IGD negatively. This could be explained when socialization contributes to better quality of friendships and stronger social ties, and subsequently refraining them from having addictive gaming behavior (Carras et al. 2017). The inconsistency of findings provided a vague understanding of the influence of this motivation type on MOBA gamers in the present context. The above empirical studies were mainly conducted in different cultural context (i.e., individualistic), which may not highly emphasize interpersonal relationships (opposite characteristics of social gamers) compared with gamers who are located in a collectivistic cultural context (i.e., Malaysia).

From another perspective, Yee (2007) suggested that immersed gamers show strong desire to explore hidden objects, customize avatar, and enjoy the temporary respite offered by the virtual world. A recent study by Khan and Muqtadir (2016) reported that immersion motivation was highly reported among problematic gamers. The problematic gaming is resulted from constant gratification of psychological needs with a sense of pleasure while immersing themselves in the virtual gaming world (Teng 2010). Specifically, immersed gamers pay a great deal of attention to the richness of the gaming world, even arriving at a state of "losing themselves." In other words, they are likely to experience a state of undifferentiated boundaries between the online and the offline worlds (Yee 2007).

Identification of Avatar

Avatar is the virtual representation of a gamer or an alter ego of a gamer in the virtual world (Lee 2007). You et al. (2017) defined identification of avatar as a process which gamer psychologically attaches onto his or her desired avatar (online game character) and develops a strong affection for it. As such, avatar is one of the key elements that greatly affect gamer's psychological experience (Klimmit et al. 2009). Consequently, the identification with their desired avatar substantially increases their overall game enjoyment (Hefner et al. 2007).

Conversely, the identification of avatar will lead to adverse consequences such as experiencing negative emotions or increasing mental distress (e.g., depression or anxiety). Identification of avatar would also lead gamers to devote more resources to maintain their virtual self, subsequently leading to addictive gaming behavior (Sioni et al. 2017). Identification of avatar has been extensively examined by past studies in MMORPG genre (e.g., Mancini et al. 2019; Van Looy et al. 2012; You et al. 2017), but studies on MOBA games are still lacking. Although both genres shared similarities up to an extent, the different research subjects and study contexts justified for the present study to be conducted.

Uses and Gratifications Theory

This theory serves as a viable alternative to understand gaming behavior. Uses and Gratifications Theory (UGT) argued that media use is a goal-driven activity. Media users are motivated

to actively search for media content while gratifying needs (Katz et al. 1974). Katz et al. (1974) proposed that cognitive need, affective need, social interaction need, personal identity need, and escapism need are presented as uses and gratifications. The determinants of the present study (i.e., motivations of gaming and identification of avatar) can be conceptually supported by UGT's five needs. Specifically, gamer's achievement motivation reflects cognitive need, gamer's immersion motivation parallels with affective and escapism needs, gamer's socialization motivation matches with social interaction need, and identification of avatar signifies personal identity need.

The Present Study

The present study utilizes UGT to examine the influential roles of motivations of gaming (i.e., achievement, socialization, and immersion) and identification of avatar in IGD among MOBA gamers aged 18 to 29 in Malaysia. Despite examining the direct effects between key variables, the present study also aims to examine the mediating effect of identification of avatar on the associations between motivations of gaming and IGD. Taken together, the hypotheses of the present study are as follows:

H_1: Achievement motivation positively predicts Internet gaming disorder among MOBA gamers.

H_2: Socialization motivation negatively predicts Internet gaming disorder among MOBA gamers.

H_3: Immersion motivation positively predicts Internet gaming disorder among MOBA gamers.

H_4: Identification of avatar positively predicts Internet gaming disorder among MOBA gamers.

H_5: Identification of avatar mediates the association between achievement motivation and Internet gaming disorder among MOBA gamers.

H_6: Identification of avatar mediates the association between socialization motivation and Internet gaming disorder among MOBA gamers.

H_7: Identification of avatar mediates the association between immersion motivation and Internet gaming disorder among MOBA gamers.

Method

Participants and Procedure

In the present study, a total of 1175 gamers were recruited. Participants were required to take part in Qualtrics online survey by clicking the provided link which was posted in 19 randomly selected Malaysian MOBA online groups in social media (e.g., Facebook and WhatsApp). Participants aged 18 or above were eligible to provide an electronic copy of consent and they were briefed about the right to withdraw from the study and the collected data were kept confidential. As the present study did not examine online gamers in general, thus four inclusion criteria had to be fulfilled: (1) are MOBA gamers, (2) aged between 18 and 29 (in accordance with the definition of youth as stated in the Malaysia Youth Policy (2018), (3) have at least 12 months of experience playing MOBA game(s), and (4) non-professional gamers. A

total of 100 sets of responses out of 1175 (8.51%) were removed due to disqualified age. They were predominantly males ($n = 808$, 75.20%) and aged between 18 and 29 ($M_{age} = 22.19$ years, SD = 3.30).

The adopted sampling method of the present study was non-probability sampling. As supported by Daniel (2012), several aspects have to be considered while determining between probability and non-probability sampling methods: size, homogeneity/heterogeneity, accessibility, and spatial distribution of the population. As the present study is one of the pioneering studies in the current context, the population size of MOBA gamers has yet to be documented, leading to difficulty in identifying the sampling frame. The four inclusion criteria as mentioned earlier reflect homogenous characteristics of the targeted population. In regard to the considerations of population's accessibility and spatial distribution, gamers might not be easily accessed in public settings. However, it was highly impractical to access their private residential areas as gamers were geographically distributed across various states in Malaysia. Considering these aspects, purposive sampling method via online survey was applied. The procedural steps were adhered to the Personal Data Protection Act (2010) and the ethical standards of Helsinki Declaration of 1975, as revised in 2005. The ethical approval was issued by the Research Management and Innovation Centre from the authors' university.

Measures

Internet Gaming Disorder Scale–Short Form (IGDS9-SF)

This scale was developed by Pontes and Griffiths (2015). This is a unidimensional scale which accesses the symptoms of IGD over the past 12-month period. It consists of nine items which are parallel with the nine diagnostic criteria of DSM-5. It is administered by a 5-point Likert scale with 1 as "never" and 5 as "very often." The higher the score, the greater the severity of the symptoms of IGD. However, this scale was not originally developed for diagnosis use. In the present study, Cronbach's alpha was high ($\alpha = .81$), reflecting strong internal consistency among the items.

Online Motivation Gaming Scale

This scale was created by Yee (2007). This 39-item scale is constituted by three subscales: achievement (14 items), socialization (11 items), and immersion (14 items). It is administered by a 5-point-construct-specific scale, for instance, 1 as "not important at all" or "not enjoyable at all" to 5 as "extremely important" or "tremendously enjoyable." The use of the construct-specific scale is applied in accordance with the nature of the items of each subscale. The higher the score, the stronger one's motivational type of gaming. The scale was highly reliable with $\alpha = .87$ for achievement, $\alpha = .81$ for socialization, $\alpha = .85$ for immersion, and the overall scale with $\alpha = .93$ in the present study.

The Player-Avatar Identification Scale

This scale was built by Li et al. (2013). This is a unidimensional scale which measures gamer's identification with his or her online character (avatar). It is administered by a 5-point Likert scale with 1 (*strongly disagree*) to 5 (*strongly agree*). The higher the score, the stronger one's identification with avatar. In the present study, this scale showed high reliability with Cronbach's alpha = .87.

Statistical Analysis

In conducting hypothesis testing, the present study applied SmartPLS version 3.0 which was developed by Ringle et al. (2015). This is a prominent statistical software which employs partial least squares structural equation modeling (PLS-SEM). To date, the application of this statistical software has gradually received positive response in psychology studies (e.g., Eh Wen 2015; Fang et al. 2016; Haider et al. 2018; T'ng et al. 2018; Wilkins et al. 2015). For instance, Park and Lee (2011) developed a research model of online game loyalty with online survey as the data collection method. The research model was tested by PLS analytical approach and was found as statistically significant.

Further, Chin (2010) and Henseler et al. (2009) agreed that PLS is more statistically appropriate than covariance-based structural equation modeling (CB-SEM) for exploratory studies or studies which are at the initial stage of theoretical development (which reflects the nature of the present study). There are several merits of using SmartPLS, for example, it allows scholars to conduct confirmatory tetrad analysis, heterotrait-monotrait ratio of correlations (HTMT) for examining discriminant validity, multigroup analysis, and measurement equivalence. According to Garson (2016), model fit indices (e.g., comparative fit index, root mean square error of approximation) are not applied in PLS; however, these fit indices are mandatory to be reported for CB-SEM. As such, CB-SEM is widely used for confirmatory studies. PLS models are built by two sets of linear equation, specifically measurement model and structural model. In the present study, a measurement model was applied to assess psychometric properties (i.e., validity and reliability). After this stage, a structural model was used for examining the direct effects and indirect effects to test the specified hypotheses.

Results

Preliminary Analysis

Preliminary analyses were conducted to ensure robustness of findings. First, analysis for detecting univariate outliers was performed. Standardized composite scores for all items were computed and cases out of the range of ± 3.29 standard deviations were labeled as univariate outliers. As such, no cases were detected or removed from the sample data after the examination, reflecting that 99.9% of the cases were distributed normally (Field 2013). The sample data were also checked for multivariate outliers with the use of Mahalanobis distance and the critical value of cases based on chi-square (χ^2) distribution, in which 26 cases were removed. A total of 1049 sets of responses were retained for the final analyses. Detailed demographic characteristics of the final sample are displayed in Table 1.

The Measurement Model

The present study analyzed the psychometric properties of measurement model such as convergent validity, discriminant validity, and composite reliabilities. In Table 2, the average variance extracted (AVE) of the latent construct ranged from .346 to .467 after six indicators below .50 factor loadings (one indicator from identification of avatar construct, two indicators from socialization motivation construct, and three indicators from achievement motivation construct) were deleted. Factor loading of each construct was statistically significant at $p < .001$. As the present study is an exploratory

Table 1 Descriptive statistics of demographic variables

	Frequency	Percentage (%)
Relationship status		
Single	784	74.7
Married	23	02.2
In relationship	238	22.7
Separated/divorced	4	.4
Employment status		
Employed	246	23.5
Unemployed	116	11.1
Others (e.g., student)	687	65.5
Racial group		
Malay	357	34.0
Chinese	472	45.0
Indian	166	15.8
Others	54	5.1
Educational level		
High school/pre-U	237	22.6
Diploma	190	18.1
Bachelor degree	589	56.1
Postgraduate degree	33	3.1
Average gaming duration (per day)		
1 h and below	182	17.3
2–4 h	641	61.1
5–7 h	189	18.0
8–10 h	30	2.9
11 h and above	7	.7
Gaming experience (in years)		
1 year	117	11.2
2–4 years	330	31.5
5–7 years	245	23.4
8–10 years	175	16.7
11 years and above	182	17.3
Average monthly spend on Internet games (RM)		
00 0–100	861	82.1
101–200	100	9.5
201–300	46	4.4
301–400	19	1.8
401 and above	23	2.2
Do you have family member(s) play Internet games?		
Yes	720	68.6
No	329	31.4

study, there were constructs that showed AVE below the .50 cut-off value. However, the majority of the constructs with AVE were more than .40. The low convergent validity did not negatively affect the discriminant validity and composite reliability of each latent construct.

Henseler et al. (2015) recommended applying HTMT for discriminant validity. There are several suggested cut-off values: HTMT .90, HTMT inference, and HTMT .85. In general, $HTMT._{90}$ and $HTMT_{inference}$ are more liberal as compared with $HTMT._{85}$. The present study applied the most stringent cut-off value ($HTMT._{85}$) while assessing discriminant validity. In Table 3, each latent construct shows good discriminant validity with all values below the suggested threshold of .85. The latent constructs of the present study also show strong internal consistency as indexed by composite reliabilities, ranging from .859 to .905, which have met the benchmark of .70 (refer to Table 2). In general, discriminant validity and composite

Table 2 Composite reliabilities and average variance extracted

Latent constructs	Composite reliabilities	Average variance extracted
IA	.893	.376
MA	.905	.467
MS	.875	.443
MI	.881	.346
IGD	.859	.407

IA identification of avatar, *MA* motivation of achievement, *MS* motivation of socialization, *MI* motivation of immersion, *IGD* Internet gaming disorder

reliabilities have not shown any violations. However, convergent validity has not met the suggested threshold. As supported by Fornell and Larcker (1981), the convergent validity of the construct is still acceptable for exploratory studies or less theoretically developed model with AVE less than .50 but with more than .60 of composite reliability.

The Structural Model

Figure 1 shows that the strongest determinant of IGD is motivation of immersion with the highest path coefficient of .366, followed by identification of avatar ($\beta = .329$), motivation of socialization ($\beta = -.273$), and motivation of achievement ($\beta = .107$). All the determinants positively predict IGD except motivation of socialization, which predicts IGD negatively. Each path coefficient is statistically significant at $p < .05$, thus H_1, H_2, H_3, and H_4 were supported. As for the mediating effect of identification of avatar, the indirect effects for the associations between the following: (1) motivation of achievement and IGD, (2) motivation of immersion and IGD, and (3) motivation of socialization and IGD were found statistically significant at $p < .05$; hence H_5, H_6, and H_7 were supported. In other words, identification of avatar serves as a significant mediator of the above associations, reflecting that both the direct effects and indirect effects are significant. The adjusted R^2 of IGD accounts for 30.8% of variances explained by all the significant determinants. According to Cohen's (1988) f^2 effect size formula ($R^2/(1 - R^2)$), values greater than .02 are small, .15 are medium, and .35 are large. Therefore, in the present study, the structural model signifies large effect size with Cohen's $f^2 = .45$.

Discussion

The present study applied UGT in examining the selected determinants (i.e., motivations of gaming and identification of avatar) of IGD among MOBA gamers in the Malaysian context.

Table 3 Discriminant validity with heterotrait-monotrait ratio of correlations (HTMT)

	IA	MA	MS	MI	IGD
IA	–				
MA	.632	–			
MS	.573	.818	–		
MI	.720	.785	.728	–	
IGD	.555	.379	.238	.538	–

IA identification of avatar, *MA* motivation of achievement, *MS* motivation of socialization, *MI* motivation of immersion, *IGD* Internet gaming disorder

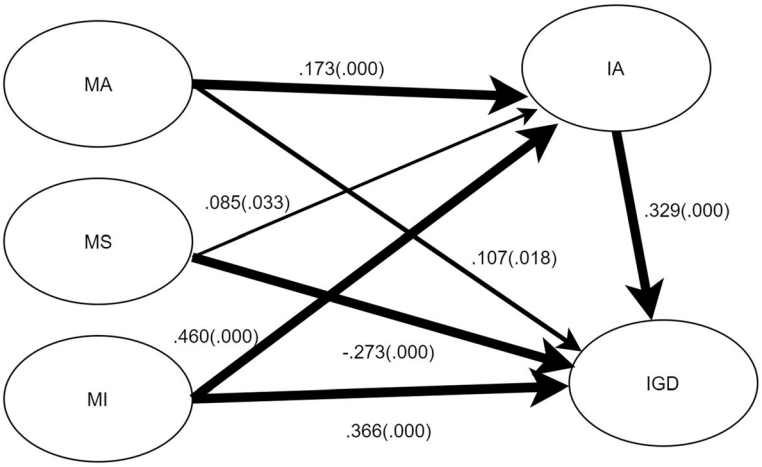

Fig. 1 Structural model of motivations of gaming, identification of avatar, and Internet gaming disorder among MOBA gamers. Note: The thicker the bolded path, the more significant the path coefficient is. The figure in parentheses next to path coefficient reflects *p* value. IA, identification of avatar; MA, motivation of achievement; MS, motivation of socialization, MI, motivation of immersion; IGD, Internet gaming disorder.

Upon the examination of the direct effects between key variables, mediating analyses were conducted. The results demonstrated that all of the motivational types of gaming (i.e., achievement, socialization, and immersion) and identification of avatar were significant determinants of IGD.

Empirical studies (e.g., Carlisle 2017; Hussain et al. 2015; Khan and Muqtadir 2016; King et al. 2017; Zhong and Yao 2013) reported that motivation of achievement was a significant determinant of IGD. It is expected that gamers who are motivated by achievement needs would devote more resources (i.e., time, effort, and money) to attain their set goals as they are likely to feel uneasy leaving their set goals unmet, and subsequently increasing their time spent on gaming activities (Kaptsis et al. 2016; King et al. 2017). In the context of MOBA, the nature of this genre has reflected the use of reinforcement strategy. Reinforcement is one of the important motivational sources to attract achievement-oriented gamers striving for more rewards and scores. Reinforcement has been regarded as an external drive to motivate an individual to persistently produce an expected action or behavior. Most of the game designers incorporated this gaming progression feature to cultivate game loyalty (Barnett and Coulson 2010). Despite these, the strong reinforcement has also substantially enhanced gamer's overall enjoyment. There is no denying that the pursuit of achievement in the virtual gaming world is intensified if the gamer has experienced more failures in the real world. Consequently, the compensation between online and offline words significantly contributes to one's problematic online gaming behavior.

Additionally, most of the past studies (e.g., Beard and Wickham 2016; Blinka and Mikuška 2014; Khan and Muqtadir 2016; Zhong and Yao 2013) reported that gamers who are motivated by social needs are prone to develop IGD. In other words, motivation of socialization predicts IGD positively. However, the present study reported inconsistent result in which social gamers of MOBA genre were found to have a negative influence on IGD. The underlying explanation of this result could be due to extensive social interaction during collective play, significantly contributing to better quality of friendship, communication skill, and social ties. Thereupon,

the positive outcomes of the collective play improve one's psychological well-being instead of developing other adverse outcomes (e.g., maladaptive coping strategies), which may lead to the formation of IGD. Consistently, Carras et al. (2017) discovered that gamers with more frequent social interactions were found to have fewer IGD symptoms. Much remains unexplored about the influential role of this motivational type, particularly among MOBA gamers in the present context and therefore restricting a clearer interpretation of the result.

Motivation of immersion was found as a significant determinant of IGD in the present study. Similarly, past studies (e.g., Cross 2016; Kardefelt-Winther 2014; Laconi et al. 2017; Šporčić and Glavak-Tkalić 2018) reported the positive role of motivation of immersion in the development of IGD. Immersed-oriented gamers use online gaming as a platform to express their life frustration and obtain psychological satisfaction (Snodgrass et al. 2013). However, this may initiate a vicious cycle in which gamers may experience more adverse consequences in return. The situation is expected to worsen in the context of MOBA genre, which is always embedded with competition and collaboration elements. During gameplay, gamers channel their attention to the richness of the fantasy virtual world. Expectedly, the greater one's immersion in the virtual world, the greater one's difficulty in drawing a clear-cut boundary between the online and offline worlds. It may also substantially increase the difficulty to withdraw themselves from the virtual gaming world.

Despite having the tentative psychological relief with the use of online gameplay, the unresolved problems in the physical world persist. It is expected that with more accumulated unresolved problems, it may bring more detrimental impacts to one's functioning. There is no denying that "immersed" gamers may experience positive outcomes (e.g., feeling of superiority and experiencing enjoyment) during or after gameplay. Nevertheless, these positive outcomes arise tentatively and they are also unlikely to counterbalance the negative outcomes due to one's excessive gaming.

Moreover, identification of avatar was found as a significant determinant of IGD in the present study. During the process of embodiment between gamer and avatar, the gamer-avatar identification is developed and intensified easily. Gamers are likely to view their avatars as being parts of themselves and they may over-empathize their avatar's experiences (Smahel et al. 2008). Strong identification with avatar can be a double-edged sword in which it may produce both positive and negative outcomes. As for positive outcomes, gamers who are attracted by the appealing traits of avatars would be given the chance to incorporate their real personal desires and aspirations. They may integrate the avatar's feelings, identities, and values as their own (Li et al. 2013). However, negative outcomes arise as gamers have to invest more resources in maintaining the virtual self despite experiencing negative consequences in other life aspects, leading to more problematic online gaming (Sioni et al. 2017).

Identification of avatar was found as a significant mediator of the associations between motivations of gaming (i.e., achievement, socialization, and immersion) and IGD. Overlooking the mediating effect of identification of avatar may lead to a misleading conclusion and diminish the effectiveness of intervention, which aims to reduce the negative impacts of problematic online gaming. In the present study, gamers who are motivated by achievement and immersion needs are prone to develop IGD. However, motivation of socialization was found as a protective factor for IGD. Specifically, having the significant mediating effect implies that identification of avatar serves as the mechanism or process that underlies the association between motivations of gaming and IGD. In other words, gamers who are motivated by strong achievement or immersion needs are likely to build stronger identification with their avatar and in return they exhibit greater risk of developing IGD. Motivation of socialization was found to have a negative impact on IGD.

However, social gamers with stronger identification of avatar are more vulnerable to experience IGD. The examination of mediating effect is crucial as it provides a clearer understanding of revealing the interaction between selected key variables.

Implications

The findings of the present study have provided a wider picture to understand the development of IGD among MOBA gamers. More effective interventions should be tailored to this vulnerable youth group (aged 18 to 29). Having the large effect size of the proposed research model, there are several implications to be highlighted. Motivation of socialization was found to have a negative impact on IGD. Therefore, more psychoeducational programs should be delivered to cultivate stronger social skill for youth in reducing their opportunities to seek gratification through online gaming activities or community. If the social needs are met in the real world, the collective gameplay will be less appealing to gamers. Despite the emphasis on social skill, a greater focus should be channeled into adaptive coping mechanisms for youth to deal with life challenges or unpleasant emotions. A temporarily escape from the physical world may be considered as a psychological relief; however, a vicious cycle is developed easily and problems remain unresolved.

Having the strong influential role of identification of avatar (in both direct effect and indirect effect) imply that youth nowadays have not been exposed to adaptive resources. It is imperative for youth to shape a more positive self-concept for strengthening greater self-acceptance. Hence, they are less likely to be attracted by the superiority of avatars. The use of avatars is mandatory in online gameplay; however, a clear boundary between online and offline worlds should be set in reducing the risk of experiencing negative outcomes given that avatars are unreal objects. In short, the present study advocates intensive collaboration between parties (i.e., policymakers, educators, mental health practitioners, and parents) for diminishing the negative impacts of IGD, which have been pervasively penetrating the daily life of youth.

Policymakers are encouraged to collaborate intensely with educators, parents, and mental health practitioners in obtaining more useful information about online gaming behavioral patterns while tailoring effective policies. For example, Park and Ahn (2010) conducted a simulation to examine the effectiveness of two policies (i.e., self-regulation policy and tax and rebate policy) in South Korean online gaming industry from 2003 to 2020. The self-regulation policy is for online game companies to adopt a fatigue system (also known as anti-online game system) on a voluntarily basis. Fatigue system is a feature in online games in which experience points (XPs) and skill points of gamers will be gradually reduced after reaching a certain time limit. The purpose of having this system is to reduce one's excessive time spent on online gaming. Tax and rebate policy is implemented in which tax is imposed on each game company based on the total active gamers, whereas rebate is offered to companies which have adopted the fatigue system. The results showed that the total revenue of gaming companies increased through the implementation of these two policies and the number of addicted gamers decreased. In general, policymakers are strongly encouraged to work hand in hand with various parties in alleviating the severity of problematic gaming culture in the present context.

Limitation, Recommendation, and Conclusion

Although the present study serves as the first study to examine the determinants of IGD among MOBA gamers, its interpretation and conclusions are found with limitations. For example, discriminant validity and composite reliabilities were established for each latent construct.

However, as the AVEs of latent constructs were below .5, this may be labeled as "provisional" and more studies are required to consolidate convergent validity of these selected scales specifically. As the present study has only included MOBA gamers, the findings may be restricted for generalizing to other game genres. More comparative studies should be conducted to examine the differences of genres in the development of IGD. As online survey was implemented in the present study, the provided responses may subject to social desirability bias. Future researchers are recommended to adopt experimental and longitudinal studies to understand the causal flow and the etiology of IGD from time to time. Despite examining the determinants of IGD, more intervention-based studies should be conducted to examine its effectiveness for alleviating this addictive behavior. More pre-existing mental disorders among gamers (e.g., depression) may be included in the future studies to unveil its influence on IGD, given that comorbidity among disorders are commonly discovered.

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Conflict of Interest The authors declare that they have no conflict of interest.

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