

# **Factors Influencing Addiction to Multiplayer Online Role-Playing Games Among Adults in the Prime Working-age Group**

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## **Abstract**

The trend of remote work has led to a rise in the popularity of multiplayer online games among working adults, offering an escape from their daily routines. The COVID-19 pandemic further boosted the global gaming market, reaching USD 249.55 billion in 2022. This study focuses on Multiplayer Online Role-Playing Games (MORPGs) addiction specifically among working adults, as previous research has mostly centered on younger individuals and students. The paper has investigated the relationships between self-esteem, the need for advancement, emotional states, social motivation, and MORPG addiction. Data was collected from 89 respondents in the Greater Kuala Lumpur/Klang Valley region using convenience sampling. Results indicated that the need for advancement significantly influenced MORPG addiction, while self-esteem, emotional states, and social motivation have no significant impact on addiction among the prime working-age group. In view of the prevalence of MORPGs, the understanding of gamers' behavior in various markets is crucial for games developers' marketing and promotional efforts.

**Keywords:** Internet Addiction, Online Games, MORPGs, Working Adults

## **1. Introduction**

The popularity of online games, has seen significant growth due to cloud gaming and 5G support. According to the data from Fortune Business Insights, the global gaming market had a value of USD 249.55 billion in 2022 and it is projected to experience substantial growth, reaching USD 281.77 billion in 2023 to USD 665.77 billion by 2030 (Gaming Market Size, Share & Growth Revenues, n.d.). The intense rivalry in the gaming market and how multiplayer online games have become a beneficial industry due to social media sharing and international publications ("Gaming Market", 2020).

Gaming has become a prominent form of entertainment worldwide, attracting a large number of people (Epstein, 2020). Engaging in multiplayer online games not only offers stress relief but also provides the opportunity to experience teamwork and a sense of accomplishment (Jenol & Pazil, 2020). Moreover, it serves as an effective means of entertainment for adults who have extra leisure time on their hands. During the COVID-19 pandemic further increased the popularity of gaming as a form of stay-at-home entertainment ("Gaming Market", 2020).

The popular multiplayer online games are such as Minecraft, CrossFire, Call of Duty, Apex Legends and Dota. The popularity of multiplayer online games has been increasing in the recent years because of its accessibility, encouraging social interactions and varied gaming experience (Arbeau et al., 2020). The games are now easily accessible with the availability of internet where the games need a strong internet connections. The players are able to interact with friends as well as strangers and compete for rewards and glory. As for gaming

experience, the players experienced teamwork, in-game communication and problem solving (Arbeau et al., 2020; Leonhardt & Overa, 2021).

However, excessive gaming, termed Internet Gaming Addiction (IGA), has become a concern. The World Health Organization (WHO) classifies it as a mental health disorder, and studies highlight its potential harmful effects on gamers' mental health. Factors like gender, age, and time spent gaming influence the likelihood of developing IGA.

In Malaysia, the number of internet users and multiplayer online gamers have increased tremendously, but this has raised concerns about unregulated gaming behavior and potential addiction, especially among the youth. The pandemic has also led to higher anxiety levels among Malaysians, with many working from home and facing challenges in achieving work-life balance.

Gaming disorder is addictive (Columb et al., 2019) or, more accurately, an addictive mental disease (Wang et al., 2019). Hence, the study aims to examine factors that contribute to MORPG's addiction among working adults in the prime working-age group (25 – 54 years) as defined by the International Labor Organization (ILO) (Department of Statistics Malaysia, 2021). The 25 – 54 age bracket can be described as one's peak earning years, where any decision to leave one's employment would significantly affect his or her career ("The Malaysian workforce", 2018, p.81). This study also hopes to lay the groundwork for future behavioral research to identify other potential determinants that may influence addiction to internet gaming and MORPG among the population's various age working structures.

Overall, the paper highlights the widespread popularity of online gaming, the concerns about its addictive nature, and the need for further research on its impact, particularly on working adults.

## **2. Literature Review**

### **2.1 Internet Games Addiction**

The internet and its wide array of online applications have gained immense popularity as a source of entertainment in modern society. Particularly, online computer games and massively multiplayer online role-playing games (MORPGs) have become highly favored, with many people spending a significant portion of their leisure time on them (Blinka & Mikuska, 2014). One notable MORPG had as many as 12 million subscribers in 2010 (Blizzard, 2010), and the number of MORPG players has been steadily increasing over the years, turning them into pop-cultural symbols due to their widespread use (Blinka & Mikuska, 2014). On average, MORPG players dedicate about 25 hours per week to gaming (Blinka & Mikuska, 2014), but a considerable number of gamers surpass this, engaging in long and compulsive gaming sessions (Blinka & Mikuska, 2014). Consequently, this behavior has garnered attention from academics and the public alike.

The addiction to technology use is a behavioral issue. It is classified as a disorder according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) as cited in . This categorization implies the potential harm it can cause to individuals (Xun et al., 2023). As stated in Xun et al. (2023), striving for perfection within the virtual gaming realm serves as a precursor to addictive behavior.

Among teenagers, online gaming addiction is the most common form of Internet addiction (Ayden & Sari, 2011). These games provide a platform for young people to express themselves in ways they might not be able to do in real life, and the pleasure derived from such engagement makes it addictive. Additionally, these games present players with never-ending objectives and tasks, leading to feelings of empowerment and an elevated social status upon achievement. Essentially, Internet gaming can serve as a means for individuals to compensate for perceived shortcomings and temporarily maintain a positive self-perception (Ayden & Sari, 2011).

Researchers suggest that individuals who are heavily engrossed in gaming may develop symptoms akin to behavioral addictions (Blinka & Mikuska, 2014). This addiction is characterized by a loss of control over gaming habits, resulting in an increase in gaming time and negative consequences in various aspects of a player's life (World Health Organization, 2018). Studies on brain activities have revealed similarities between substance use disorders and behavioral addictions, such as gaming disorders (Gros et al., 2020). Time spent online has been identified as a critical factor in Internet addiction, as longer durations allow for deeper exploration and connection, influencing psychological motivation and engagement (Yao et al., 2014).

While it is considered normal for working adults to unwind by playing MORPGs after a long day at work, excessive gaming becomes problematic when it leads to neglecting real-life responsibilities and negatively affecting health and well-being (Kaneaiakala, 2018). Moreover, high levels of Internet addiction have been associated with psychiatric symptoms, particularly those resembling obsessive-compulsive disorder (Alavi et al., 2011). Billieux et al. (2015) proposed three impacts of MORPG addiction on working adults: first, it may lead to a lack of self-control over daily activities due to the impulsivity inherent in online games; second, poor decision-making abilities may be exhibited due to this lack of self-control; and lastly, MORPG players may experience intrusive thoughts or cravings related to the online game, immediately triggering their reinforcement-seeking motivational system.

## **2.2 Self-esteem**

Numerous researchers have acknowledged that individuals with lower self-esteem are more likely to develop internet addiction (Yao et al., 2014). Self-esteem is the way a person views themselves and their sense of self-worth (Rosenberg et al., 1989). It plays a crucial role in overall well-being and psychological health, as it has positive effects on various aspects of life. However, studies have shown that individuals with mental health disorders often experience lower self-esteem (Kim et al., 2020b). The link between self-esteem and internet addiction has been explored in previous research, with evidence indicating that people with poor self-esteem may turn to the internet to find solace and a sense of belonging (Yao et al., 2014). This connection between self-esteem and addiction is well-established and has been supported by several studies (Aydin & Sari, 2011).

Kim et al. (2020b) pointed out that excessive smartphone use, particularly through mobile gaming apps, can act as a trigger for internet addiction, negatively affecting both device health and overall well-being. Armstrong et al. (2000) also found that low self-esteem is a significant predictor of internet addiction. Furthermore, Kim et al. (2020b) conducted a study that revealed a negative correlation between self-esteem and the propensity for Korean smartphone addiction among individuals with internet gaming disorder. Interestingly, their research showed that male participants with internet gaming disorder tended to have lower self-esteem compared to female participants. In addition, Kim et al. (2020b) found that adults with internet gaming issues who reported dissatisfaction with their family ties had lower self-esteem than those who expressed contentment with their family relationships. Aydin & Sari (2011) conducted research that demonstrated a strong negative association between internet addiction and general self-esteem, social self-esteem, family-home self-esteem, and overall self-esteem. They also found that social and family-home self-esteem were significant predictors of internet addiction.

## **2.3 Need for advancement**

The "need for advancement" refers to the desire to progress and excel in a game. It has been defined as the longing to gain power, make rapid progress, and accumulate in-game symbols of wealth or status (Xu et al., 2012). This concept is rooted in the broader concept of the "need for achievement," which encompasses the desire to advance in games, become an expert, and compete with others (Yee, 2006). These motivational factors are associated with the need for a sense of control, which drives individuals to engage in online games (Xu et al., 2012).

Billieux et al. (2015) have elaborated on the specific structural characteristics of Massively Multiplayer Online Role-Playing Games (MORPG) that can have addictive effects on users. These characteristics include a permanent virtual world, a reinforcement schedule, advancement systems, and interfaces that encourage social interactions. Among these, the concept of "advancement" stands out as a key element in playing MORPG. Players are rewarded with new powers, skills, or in-game items after completing missions or quests.

The relationship between the "need for advancement" and problematic internet use (PIU) has yielded mixed findings in previous studies (Chang et al., 2018). Xu et al. (2012) suggested that the "need for advancement" could be an essential motivating factor that has a positive impact on game playing, possibly contributing to higher levels of technology addiction. Both escapism and the desire for advancement have been identified as

significant mediators for PIU (Chang et al., 2018). It has been found that the pursuit of advancement may encourage players to spend more time in the game, potentially leading to problematic internet use.

According to the findings of Chang et al. (2018), many gaming players are strongly attracted to virtual worlds, exhibiting symptoms of addiction, often referred to as the "pull effect." This effect is similar to the motivation behind seeking in-game advancement. Chang et al. (2019) hypothesized that gamers who actively seek challenging obstacles to achieve difficult gaming goals experience a sense of achievement, indicating a clear need for advancement.

## **2.4 Emotional states**

According to Gros et al. (2020), emotional states encompass pleasure and happiness. Pleasure is described as a short-lived emotional state arising from the fulfillment of a desire, while happiness is a more enduring emotional state characterized by contentment. The psychophysiological and brain mechanisms underlying emotional states are complex, necessitating further research for a deeper understanding (Gros et al., 2020). However, there is currently a lack of formal research investigating the perception of emotional states in the context of addiction. To better comprehend the connection between emotional states and addiction, it is essential to distinguish clearly between pleasure and happiness (Gros et al., 2020). Previous studies suggest that emotional states may operate at both conscious and unconscious levels (Gros et al., 2020).

Emotional states can be divided into two main categories: positive and negative emotional states (Longstreet et al., 2019). Positive emotional states include happiness and life satisfaction, while negative emotional states consist of depression, anxiety, and loneliness (Longstreet et al., 2019). Anxiety is characterized by inner turmoil and discomfort, often accompanied by nervous behaviors, and it involves negative feelings related to future events (Anxiety, n.d.). Internet addiction is primarily driven by the desire to alleviate negative emotions while increasing positive ones (Longstreet et al., 2019). Individuals experiencing symptoms of depression, loneliness, and unhappiness are more likely to develop Internet addiction (Longstreet et al., 2019).

Initially, individuals may believe that using the Internet will help them achieve positive emotional states (Longstreet et al., 2019). They might see Internet usage as a solution to their negative emotional states. However, prolonged and excessive Internet use can lead to Internet addiction, ultimately weakening positive emotional states and increasing negative ones (Longstreet et al., 2019). The Internet may be used as a coping mechanism, resulting in a further increase in negative emotional states and a reduction in positive emotional states as the individual becomes more deeply entrenched in addictive behavior (Longstreet et al., 2019).

In their research, Longstreet et al. (2019) concluded that Internet addiction has significant relationships with both positive and negative emotional states, indicating that it influences these states simultaneously rather than independently. There was a positive and significant relationship between Internet addiction and negative emotional states, while a negative and significant relationship was found with positive emotional states. The researchers emphasized that coping behavior is a crucial factor in the continued use of the Internet, which plays a significant role in the development of Internet addiction.

Similarly, Gros et al. (2020) established a significant relationship between video game play and happiness (an emotional state) as expressed by addicted users. Additionally, Servidio et al. (2021) conducted research to examine the relationship between maladaptive behavior variables (including negative emotional states), fear of COVID-19, and Internet addiction disorder. Their findings indicated that anxiety (one of the negative emotional states considered in the study) was associated with Internet addiction disorder.

## **2.5 Social motivation**

Identifying individual motivational differences among players of Massively Multiplayer Online Role-Playing Games (MORPG) is crucial to better understand their interactions with other players (Yee, 2006). By exploring the underlying basis of different motivations within the player demographic, we can determine whether certain motivations are more strongly related to usage patterns or in-game behaviors (Yee, 2006). Yee's

motivations stand as one of the most prominent theories extensively utilized in the field of MORPG, as noted by Sun et al. (2023). Chang et al. (2021) research has incorporated socialization factors into their analysis of motivations for engaging in online games. The results revealed that socialization extends beyond online gaming environments. Thus they concluded that MORPG can enhance player experiences and at the same time gain insights into their social interactions be it online or offline. Studies have shown that online gamers often spend significant amounts of time playing, leading to potential addiction. Motivation plays a key role in this addiction to online games (Barnett & Coulson, 2010).

Three distinct types of motivation have been identified: achievement motivation, social motivation, and immersion motivation (Barnett & Coulson, 2010). Social motivation refers to the enjoyment players derive from networking, helping others, seeking and providing support, building relationships, and playing as part of a team (Blinka & Mikuska, 2014). Higher levels of social motivation for gameplay have been found to be positively associated with online game addiction, suggesting that greater social motivation may lead to problematic gameplay (Blinka & Mikuska, 2014).

The motivation to play MORPG varies among highly engaged and compulsive players. Social motivation emerges as a significant factor in gaming behavior, and interestingly, male and female players are motivated to participate in MORPG for different reasons (Yee, 2006). While social interaction in online games can be appealing, it may also bring about negative consequences related to online gaming (Blinka & Mikuska, 2014). The existence of social motivation in online games warrants examination to understand why people seek out online communities (Yee, 2006). Lou et al. (2019) found that social motivation significantly influences the team player selection process in MORPG, indicating its importance in shaping players' interactions and experiences within the game.

In summary, understanding the various motivations driving players' engagement with MORPG is essential to comprehend their interactions, addiction patterns, and overall gaming behavior. Social motivation has been identified as a particularly significant factor in shaping gameplay experiences and can play a crucial role in players' online interactions. Thus the aim of the study is to understand MORPG addictions among working adults by examining self-esteem, the need for advancement, emotional states, and social motivation. Hence, the framework has been developed (Fig. 1).

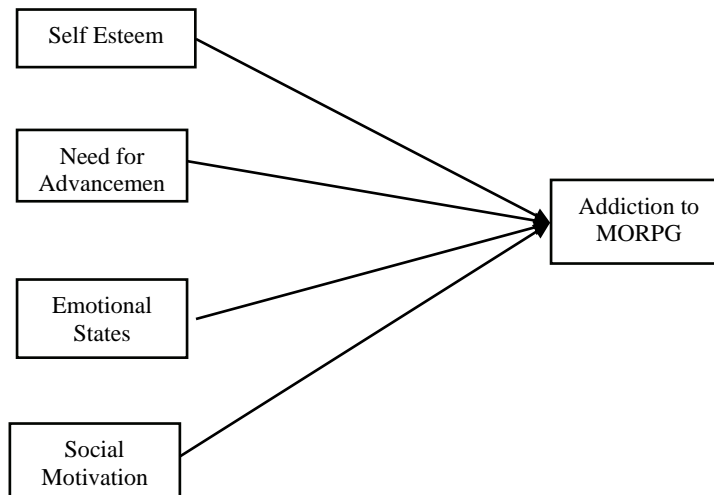


Fig. 1 The Conceptual Framework

### 3. Methodology

The study has used a self-administered e-questionnaire via Google Forms to collect the empirical data. The target population was working adults in the prime working-age group who plays MORPG in Malaysia. The assessment of all variables included in the conceptual framework was by a six-point Likert scale (from (1)

"strongly disagree" to (6) "strongly agree"). The items for gaming addiction are from Charlton & Danforth (2007), self-esteem from Yao et al. (2014), emotional states (Gros et al., 2020), the need for advancements (Xu et al., 2012) and social motivation (Koo, 2009; Yee, 2006).

The questionnaire consisted of four sections. Section A was on questions pertaining to the respondent's personal information or demographic profiles. This section had general questions and more specific questions were on the frequency of playing MORPG, hours spent to play MORPG in a day, the feelings after playing the games and the total amount of money spent in a month on MORPG. Section B was to compile the respondents' replies on the addiction to MORPG. Section C, D, E and F were to gather the respondents' responses on the independent variables namely, self-esteem, need for advancement, emotional states and social motivation respectively.

The survey was administered using convenience and snowball sampling techniques (i.e., non-probability sampling methods) to recruit respondents. The invitation to participate in the survey was made via social media platforms, i.e., Facebook and WhatsApp. The respondents were then directed to the questionnaire using a link to a google form. SPSS version 26 has been used to test the model. The sample size of 89 online game users have been collected.

#### 4. Findings

This paper has investigated the determinants of internet games addiction among working adults in the prime working age group. There are five (5) variables used where the dependent variable is the internet games addiction and the independent variables are self-esteem, need for advancement, emotional states, and social motivation. It was found that out of 89 respondents, 61% are male and 39% are female respondents, with 79% are within the age group of 25-34 years old and 43% have income tabulation between RM1001-RM2500.

Table 1: Reliability Analysis

Variables	Number of items	Cronbach Alpha
Internet games addiction	7	0.887
Self-esteem	5	0.730
Need for advancement	5	0.925
Emotional states	5	0.954
Social motivation	5	0.943

Based on the reliability analysis table above, the Cronbach alpha for internet games addiction with 7 items is 0.887, while for self-esteem with 5 items is 0.730, need for advancement with 5 items is 0.925, emotional states with 5 items is 0.954 and social motivation with 5 items is 0.943. From the reliability analysis table, of all the 5 variables have shown value of at least 0.7 which is considered acceptable. Thus, it can be concluded that all items for each construct are in the range of good, very good and excellent, which represent high stability and consistent results.

Table 2: Correlation Analysis

		Internet games addiction	Self esteem	Need for advancement	Emotional states	Social motivation
Internet games addiction	Pearson correlation	1	-0.032	0.546**	0.292**	0.369**
	Sig. (2-tailed)		0.766	<0.001	0.005	<0.001
	N	89	89	89	89	89
Self esteem	Pearson correlation	-0.032	1	0.158	0.236*	0.164
	Sig. (2-tailed)	0.766		0.14	0.026	0.124

	N	89	89	89	89	89
Need for advancement	Pearson correlation	0.546**	0.158	1	0.542**	0.539**
	Sig. (2-tailed)	<0.001	0.14		<0.001	<0.001
	N	89	89	89	89	89
Emotional states	Pearson correlation	0.292**	0.236*	0.542**	1	0.767**
	Sig. (2-tailed)	0.005	0.026	<0.001		<0.001
	N	89	89	89	89	89
Social motivation	Pearson correlation	0.369**	0.164	0.539**	0.767**	1
	Sig. (2-tailed)	<0.001	0.124	<0.001	<0.001	
	N	89	89	89	89	89

\*\*Correlation is significant at the 0.01 level (2-tailed)

\* Correlation is significant at the 0.05 level (2-tailed)

From Table 2, correlation analysis, the construct on self-esteem has the lowest p value of -0.032 which indicate negative and negligible association to internet games addiction. A negative association or inverse association is where when self-esteem level is high, internet games addiction level is low and vice versa. The second construct which is need for advancement p value is 0.546, shows a moderate and positive correlation with internet games addiction. A low association is found for emotional states with p value of 0.292 and social motivation p value of 0.369.

Table 3: Regression Analysis

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.571*	0.326	0.294	1.06499

\* Predictors: (Constant), Social motivation, Self esteem, Need for advancement, Emotional States

**Coefficients\***

Model		Standarized Coefficients Beta	t	Sig.
1	(Constant)		2.878	0.005
	Self esteem	-0.120	-1.300	0.197
	Need for advancement	0.520	4.745	<0.001
	Emotional states	-0.107	-0.734	0.465
	Social motivation	0.190	1.323	0.189

\* Dependent variable: Internet games addiction

In the model summary has R square of 0.326, it means that 32.6% of the variance in the internet games addiction can be explained by self-esteem, need for advancement, emotional states, and social motivation. The remaining 67.4% cannot be explained due to the omission of other variables that are not included in the study.

From the coefficient table above, the most significant independent variable is need for advancement with less than 0.001. Leaving the other three independent variable as insignificant.

From the regression table the most significant variable is need for advancement has a significant relationship with internet games addiction ( $p < 0.001$ ). While self-esteem, emotional states and social motivation are not significant for internet games addiction. From the correlation analysis, self-esteem has shown a negative relationship with internet games addiction. When the variables are regressed, another independent variable (emotional states) is found to have a negative relations with internet games addiction.

## 5. Discussion & Conclusion

From this study, it is obvious that the need for advancement is important element in developing internet games. Where from this study  $r$  value is significant ( $p < 0.001$ ). The results of this study suggest that game vendors or designers can leverage the identified need for advancement to enhance their game designs for engaging players in an online environment. By incorporating elements that cater to players' desire for progress and a sense of value, game developers can create more appealing and desirable activities that will attract and retain players in the online setting. Thus it is necessary to effectuate improvements to make games more attractive to players to make players more interested and engaged in their games. This finding is consistent with the study conducted by Lin et al (2015) which found that advancement need has derived a highly engaged internet game players in their games. Therefore, the element of need of advancement is essential in any internet game design to ensure players' engagement.

However, on the players well-being aspect, the internet games addiction (IGA) should sound an alarm for concern as it would affect players' mental state. Gupta et al. (2023) has stated that IGA is a disorder that necessitate focused efforts to comprehend and mitigate its impact. Thus, internet gaming addiction, if left uncontrolled and unsupervised, could lead to mental health disorder. Indeed, this study can provide valuable insights for countries, governments, and industries to address the threats associated with IGA. By understanding the factors contributing to gaming addiction, policymakers can formulate targeted strategies and interventions to tackle the issue effectively. It can aid in the development of appropriate regulations, educational programs, and support systems to protect vulnerable individuals from the negative consequences of excessive gaming. Furthermore, industries involved in the gaming sector can use this research to design games responsibly, taking into account potential addiction risks and implementing features that promote a healthy gaming experience. Overall, the study's findings can contribute to a more comprehensive approach in managing and mitigating the challenges posed by IGA.

## References

- Age group distribution of internet users in Malaysia as of August 2018. (2021). Retrieved from <https://www.statista.com/statistics/981334/malaysia-internet-users-age-group-distribution/>
- Alavi, S.S., Maracy, M.R. Jannatifard, F., & Eslami, M. (2011). The effect of psychiatric symptoms on the internet addiction disorder in Isfahan's University students. *Journal of Research in Medical Sciences*, 16(6), 793 – 800.
- Anxiety. (n.d.). In Wikipedia. Retrieved July 10, 2021, from <https://en.wikipedia.org/wiki/Anxiety>
- Armstrong, L., Phillips, J.G., & Saling, L.L. (2000). Potential determinants of heavier Internet usage. *International Journal of Human-Computer Studies*, 53:537–550.
- Arbeau, K., Thorpe, C., Stinson, M., Budlong, B., & Wolff, J. (2020). The meaning of the experience of being an online video game player. *Computer Human Behavior Reports*, 2, 100013.
- Aydin, B., & Sari, S. V. (2011). Internet addiction among adolescents: The role of self-esteem. *Procedia Social and Behavioral Sciences*, 15, 3500–3505.
- Barnett, J., & Coulson, M. (2010). Virtually real: A psychological perspective on massively multiplayer online games. *Review of General Psychology*, 14, 167–179.
- Billieux, J., Deleuze, J., Griffiths, M. D., & Kuss, D. J. (2015). Internet gaming addiction: The case of massively multiplayer online role-playing games. In N. El-Guebaly, G. Carrà, & M. Galanter (Eds.), *Textbook of addiction treatment: International perspectives*, (pp. 1515–1525), Milan: Springer. Retrieved from [http://link.springer.com/referenceworkentry/10.1007/978-88-470-5322-9\\_105](http://link.springer.com/referenceworkentry/10.1007/978-88-470-5322-9_105)



- Blinka, L. & Mikuska, J. (2014). The role of social motivation and sociability of gamers in online game addiction. *Journal of Psychosocial Research on Cyberspace*, 8(2). Doi: 10.5817/CP2014-2-6
- Blizzard (2010). World Of Warcraft® Subscriber Base Reaches 12 Million Worldwide. Retrieved from <http://us.blizzard.com/en-us/company/press/pressreleases.html?id=2847881>
- Chang, S. M., Hsieh, G. M., & Lin, S. S. (2018). The mediation effects of gaming motives between game involvement and problematic Internet use: Escapism, advancement and socializing. *Computers & Education*, 122, 43–53. Doi:10.1016/j.compedu.2018.03.007
- Chang, S.M., & Lin, S.S.J. (2019). Online gaming motive profiles in late adolescence and the related longitudinal development of stress, depression, and problematic internet use. *Computers & Education*, 135, 123–137.
- Chang, W-L., Chen, L-M. and Hsieh, Y-H. (2022). Online to offline social interaction on gaming motivations. *Kybernetes*, Vol. 51, pp. 3508-3525.
- Charlton, J.P. & Danforth, I.D.W. (2007). Distinguishing addiction and high engagement in the context of online game playing. *Computers in Human Behavior*, 2(3), 1531-1548.
- Columb, D., Griffiths, M.D. & O'Gara, C. (2019). Online gaming and gaming disorder: more than just a trivial pursuit. *Irish Journal of Psychology Medicine*, 1- 7. Doi:10.1017/ipm.2019.31
- Department of Statistics Malaysia. (2020). ICT use and access by individuals and households survey report. Retrieved from <https://www.dosm.gov.my/v1/index.php?r=column/pdfPrev&id=SFRacTRUMEVRUFo1Ulc4Y1JILzBqUT09>
- Department of Statistics Malaysia. (2021). Principal statistic of labor force, Malaysia, first quarter (Q1) 2019. Retrieved from [https://dosm.gov.my/v1/index.php?r=column/cthemeByCat&cat=149&bul\\_id=RHN4VDhObTZEkzJZSHRqdmNWRjdrdz09&menu\\_id=U3VPMldoYUxzVzFaYmNkWXZteGduZz09#:~:text=%5B1%5D%20International%20Labour%20Organization%20\(population%20aged%2025%E2%80%9354%20years.&text=In%20the%20first%20quarter%20of%202019%2C%20the%20labour%20force%20was,cent%20females%20\(6.06%20million\).](https://dosm.gov.my/v1/index.php?r=column/cthemeByCat&cat=149&bul_id=RHN4VDhObTZEkzJZSHRqdmNWRjdrdz09&menu_id=U3VPMldoYUxzVzFaYmNkWXZteGduZz09#:~:text=%5B1%5D%20International%20Labour%20Organization%20(population%20aged%2025%E2%80%9354%20years.&text=In%20the%20first%20quarter%20of%202019%2C%20the%20labour%20force%20was,cent%20females%20(6.06%20million).)
- Elliot, R. (2020). Insights into Malaysia's games market and its gamers. Retrieved from <https://newzoo.com/insights/articles/insights-into-malaysias-games-market-and-its-gamers/>
- Epstein, A. (2020). Game on: how Covid-19 became the perfect match for gamers. Retrieved from <https://www.weforum.org/agenda/2020/09/covid19-coronavirus-pandemic-video-games-entertainment-media/>
- Escapism. (2021). Retrieved from <https://www.merriam-webster.com/dictionary/escapism>
- Gaming Market Size, Share & COVID-19 Impact Analysis, By Game Type (Shooter, Action, Sports, Role Playing, and Others), By Device Type (PC/MMO, Tablet, Mobile Phone, and TV/Console), By End-User (Male and Female), and Regional Forecast, 2023-2030. Retrieved from <https://www.fortunebusinessinsights.com/gaming-market-105730>
- Gupta, K., Kumar, C., Deshpande, A., Mittal, A., Chopade, P., & Raut, R. (2023). Internet gaming addiction—a bibliometric review. *Information Discovery and Delivery*.
- Gros, L., Debue, N., Lete, J. & Van de Leemput, C. (2020). Video game addiction and emotional states: possible confusion between pleasure and happiness? *Frontiers in Psychology*. Doi=10.3389/fpsyg.2019.02894
- Haagsma, M.C., Pieterse, M.E., & Peters, O. (2012). The prevalence of problematic video gamers in the Netherlands. *Cyberpsychology, Behavior, and Social Networking*, 15(3), 162-168.
- How Covid-19 reshapes the landscape of online gaming. (2020) Retrieved from <https://www.lifestyleasia.com/bk/gear/tech/covid-19-online-gaming-esports/>
- Impact of Covid-19 on the frequency of multiplayer video games worldwide as of June 2020. (2021). Retrieved from <https://www.statista.com/statistics/1188549/covid-gaming-multiplayer/>
- Jenol, N.A.M. & Pazil, N.F.A. (2020). Escapism and motivation: understanding K-pop fans well-being and identity. *Malaysian Journal of Society and Space*, 16(4), 336-347.
- Kaneaiakala, B. (2018). Adults not immune to issues with video gaming. Retrieved from <https://www.psychcongress.com/article/treatment/adults-not-immune-issues-video-gaming>
- Kim, H., Choi I.Y., & Kim D.J. (2020). Excessive Smartphone Use And Self-Esteem Among Adults With Internet Gaming Disorder: Quantitative Survey Study. *JMIR mHealth uHealth*, 8:1–11. Doi: 10.2196/18505
- Kim, N., Kim, J.K., Hughes, T.L., Kwak, H., & Kong, I.D. (2020). Relationships of internet gaming reasons to biological indicators and risk of internet gaming addiction in Korean adolescent male game users. *BMC Psychiatry*, 20(341). Doi:10.1186/s12888-020-02714-w

- Koo, D.M. (2009). The moderating role of locus of control on the links between experiential motives and intention to play online games. *Computers in Human Behavior*, 25(2), 466–474. Doi:10.1016/j.chb.2008.10.010
- Laato, S., Najmul Islam, A.K.M., Farooq, A., & Dhir, A. (2020). Unusual purchasing behavior during the early stages of the COVID-19 pandemic: The stimulus-organism-response approach. *Journal of Retailing and Consumer Services*, 57, 1-12. Doi: 10.1016/j.jretconser.2020.102224
- Lawrence, T.L., & Peng, Z.W. (2010). Effect of pathological use of the Internet on adolescent mental health. *JAMA Pediatrics*, 164,901–906. Doi: 10.1001/archpediatrics.2010.159
- Lee, S.L. (2020). Is your teen addicted to gaming? It could be a mental disorder. Retrieved from <https://www.thestar.com.my/lifestyle/health/2020/01/03/get-help-for-your-teen-with-gaming-addiction>
- Leonhardt, M., & Overa, S. (2021). Are There Differences in Video Gaming and Use of Social Media among Boys and Girls?—A Mixed Methods Approach. *Int. J. Environ. Res. Public Health*, 18, 6085.
- Lin, C.Y., Hung, W.H., Fang, K. & Tu, C.C. (2015). Understanding players' achievement values from MMORPGs: an exploratory study. *Internet Research*, 25 (5) (2015), pp. 829-851, 10.1108/IntR-12-2013-0268
- Longstreet, P., Brooks, S., & Gonzalez, E. S. (2019). Internet addiction: When the positive emotions are not so positive. *Technology in Society*, 57, 76-85.
- Lou,T., Zu Y., & Zhu, L. (2019). A study of motivation and team member selection in online games. *Asia Pacific Journal of Marketing and Logistics*, Vol. 32, No. 6, 1286-1304, doi 10.1108/apjml-04-2019-0234
- Maldonado-Murciano, L., Pontes, H.M., Griffiths, M.D., Barrios, M., Gomez-Benito, J., & Guilera, G. (2020). The Spanish version of the internet gaming disorder scale-short form (IGDS9-SF): Further examination using item response theory. *International Journal of Environment Research and Public Health*, 17(19), 7111. doi:10.3390/ijerph17197111
- Miezah, D., Batchelor, J., Megreya, M.A., Richard, Y., & Moustafa, A.A. Video/Computer Game Addiction among University Students in Ghana: Prevalence, Correlates and Effects of Some Demographic Factors. *Psychiatry and Clinical Psychopharmacology*, 2020;30(1):x-x. DOI:10.5455/PCP.20200320092210
- Mobile games thrive, even as Covid-19 pandemic keeps players home. (2020). Retrieved from <https://www.straitstimes.com/tech/tech-news/mobile-games-thrive-even-as-pandemic-keeps-players-home>
- Nasution, F.A., Effendy, E., & Amin, M.M. (2019). Internet gaming disorder (IGD); a case report of social anxiety. *Open Access Macedonian Journal of Medical Sciences*, 7(16), 2664-2666. Doi: 10.3889/oamjms.2019.398
- Number of internet users in Malaysia from 2015 to 2025. (2021). Retrieved from <https://www.statista.com/statistics/553752/number-of-internet-users-in-malaysia/>
- Online games. (2021). Retrieved from <https://www.statista.com/outlook/212/122/online-games/malaysia>
- Roscoe, J. T. (1975). *Fundamental research statistics for the behavioral sciences (Second ed.)*. New York: Holt Rinehart and Winston.
- Rosenberg, M., Schooler, C., & Schoenbach, C. (1989). Self-esteem and adolescent problems: Modeling reciprocal effects. *American Sociological Review*, 54, 1004–1018.
- Severo, R.B., Soares, J.M., Affonso, J.P., Giusti, D.A., de Souza Junior, A.A., de Figueiredo, V.L., Pinheiro, K.A., & Pontes, H.M. (2020). Prevalence and risk factors for internet gaming disorder. *Brazilian Journal of Psychiatry*, 42(5), 532-535. Doi: org/10.1590/1516-4446-2019-0760
- Servidio, R., Bartolo, M.G., Palermi, A.L., & Costabile, A. (2021). Fear of COVID-19, depression, anxiety, and their association with Internet addiction disorder in a sample of Italian students. *Journal of Affective Disorders Reports*, 4, 100097. Doi:<https://doi.org/10.1016/j.jadr.2021.100097>.
- Sivanandam, H. (2021). Malaysians the most stressed out from Covid-19 and WFH. Retrieved from <https://www.thestar.com.my/news/nation/2021/01/22/malaysians-the-most-stressed-out-from-covid-19-and-wfh>
- Snider, M. (2019). Video game addiction is officially a mental disorder, WHO says. Retrieved from <https://www.usatoday.com/story/tech/news/2019/05/28/who-officially-classifies-video-game-addiction-mental-disorder/1256352001/>
- Sun, S., Kim, J.H., Lee, K.M., & Nan, D. (2023) Exploring the association between the Proteus effect and intention to play massive multiplayer online roleplaying games (MMORPGs)[J]. *Internet Research*.
- The Malaysian workforce: a changing landscape. (2018). Retrieved from [http://www.krinstitute.org/assets/contentMS/img/template/editor/Part2\\_KRI\\_SOH\\_2018.pdf](http://www.krinstitute.org/assets/contentMS/img/template/editor/Part2_KRI_SOH_2018.pdf)
- The Recovery Village. (2020). Video game addiction statistics. Retrieved from <https://www.therecoveryvillage.com/process-addiction/video-game-addiction/related/gaming-addiction-statistics/>

- T'ng, S. T., & Pau, K. (2020). Validation of a translated internet gaming disorder scale (short form) and measurement invariance across sex groups in Malaysian samples. *Current Psychology*. Doi:10.1007/s12144-020-00668-6
- T'ng, S.T., Ho, KH, Sim, D.E., Yu, C.H., & Wong, P.Y. (2019). The mediating effect of internet gaming disorder's symptoms on loneliness and aggression among undergraduate students and working adults in Malaysia. *PsyCh Journal*. Doi: 10.1002/pchj.320
- Tonioni, F., D'Alessandris, L., Lai, C., Martinelli, D., Corvino, S., Vasale, M., Fanella F, Aceto, P., & Bria, P. (2012). Internet addiction: hours spent online, behaviors, and psychological symptoms. *General Hospital Psychiatry*, 34(1), 80-87.
- U of S research finds video games can relieve stress, improve mental health. (2020). Retrieved from <https://www.cbc.ca/news/canada/saskatoon/u-of-s-research-finds-video-games-can-relieve-stress-improve-mental-health-1.5563824>
- Video games addiction symptoms and treatment. (2021). Retrieved from <https://americanaddictioncenters.org/video-gaming-addiction>
- Wang, J.L., Sheng, J.R., & Wang, H.Z. (2019). The association between mobile game addiction and depression, social anxiety, and loneliness. *Frontiers in Public Health*, 7(247). Doi: 10.3389/fpubh.2019.00247
- Weinstein, A., & Lejoyeux, M. (2010). Internet addiction or excessive internet use. *The American Journal of Drug and Alcohol Abuse*, 36,277–283.
- World Health Organization [WHO] (2018). Available at: <https://www.who.int/features/qa/gaming-disorder/en/> (accessed December, 2018).
- Xu, Z., Turel, O., & Yuan, Y. (2012). Online game addiction among adolescents: motivation and prevention factors. *European Journal of Information Systems*, 21(3). Doi: 10.1057/ejis.2011.56
- Xun, Y., Zheng, X., Lee, M., & Yang, F. (2023). The influence of technology affordance on addictive use in MMOGs: from the perspective of virtual-domain perfectionism. *Emerald Publishing Limited*, 1066-2243.
- Yao, M.Z, He, J., Ko, D.K., & Pang, K. (2014). The influence of personality, parental behaviors, and self-esteem on internet addiction: a study of Chinese college students. *Cyberpsychology, Behavior, and Social Networking*, 17(2), 104-110.
- Yee, N. (2006). The demographics motivations and derived experiences of users of massively multi-user online graphical environments. *Presence: Teleoperators and Virtual Environments*, 15(3), 309-329. Doi:10.1162/pres.15.3.309
- Yee, N. (2006). Motivations for play in online games, *CyberPsychology and Behavior*, Vol. 9 No. 6, pp. 772-775.