AJMB
eISSN: 2600-8173
https://doi.org/10.37231/ajmb.2024.8.1.706
https://journal.unisza.edu.my/ajmb
PENERBIT Universiti Sultan Zainal Abidin
Asian Journal of Medicine and Biomedicine

Online Gaming Addiction Among UiTM Puncak Alam Pharmacy Students Amid COVID-19 Pandemic

Azyyati Mohd Suhaimi[1*], Kasyful Azhim Zainal[2], Mohd Shahezwan Abd Wahab[2], Nor Hayati Abu Samah[2], Siti Alwani Ariffin[2] and Ali Haider Mohammed[3]

[1]Department of Pharmacology and Toxicology, Faculty of Pharmacy, Universiti Sultan Zainal Abidin, Kampus Besut, 22200 Besut, Terengganu, Malaysia.
[2]Faculty of Pharmacy, Universiti Teknologi MARA Selangor, Kampus Puncak Alam, 42300 Puncak Alam, Selangor, Malaysia.
[3]School of Pharmacy, Monash University Malaysia, Jalan Lagoon Selatan, 47500 Bandar Sunway, Selangor, Malaysia.

Corresponding author: azyyati.ms@gmail.com

Received: 11th September 2023 **Accepted: 22nd January 2024** **Published: 28th February 2024**

Abstract

Stress among the university students had been triggered by the long-haul social distancing during the pandemic. Many had turned to playing video games more than usual as a social lifeline that could be potentially addictive. This study aims to evaluate the level of video gaming addiction during COVID-19 pandemic particularly among the UiTM Puncak Alam students. A cross-sectional study design with self-administered online survey was used to achieve the targeted objectives. The survey included several sections such as frequency of playing video games and 7-Item Game Addiction Scale (GAS). More than half of the cohort were females (60%) with average age of 23.46 ± 3.64 years. The findings showed that on average, these video gamers played approximately 2.33 ± 1.83 hours daily or 3.82 ± 2.04 days weekly. This study revealed that the prevalence of pathological and excessive gamers was low among the pharmacy students even during the pandemic restriction.

Keywords:
Video Games; Young Population; Online Addiction; COVID-19; Pharmacy; Undergraduate

Introduction

The impact of coronavirus disease 2019 (COVID-19) has inevitably causes so much distress to billions of people around the globe, with the ensuing lockdown period, quarantine, closure of schools or business and

https://doi.org/10.37231/ajmb.2024.8.1.706
https://journal.unisza.edu.my/ajmb

the social distancing measures. To combat this, several COVID-19 vaccines were authorized for emergency use or approved by regulatory authorities worldwide with varying levels of effectiveness against the new variants[1]. The various imposed restrictions to prevent and minimize the spread of viral infections had affected the way people socialize and brought imminent changes to their daily lives.

In Malaysia, the Movement Control Order (MCO) was first implemented on 18 March 2020 resulting in the closure of nearly all sectors except businesses providing essential foods and items[2]. With the lockdown restriction and self-isolation measure, many people who were housebound resorted to finding alternative means for limited leisure activities, including playing video games at home. This is in line with the #PlayApartTogether campaign by the World Health Organization (WHO) in collaboration with the gaming industries to promote the supporting role of online gaming to encourage healthy physical distancing.

Since early 2000, online games have been breaching the video gaming platform to become immensely popular among youngsters. The variety of gaming platforms such as personal computers, smartphones, consoles, tablets, and laptops, coupled with remarkably increasing demand have contributed to their recent surge in becoming one of the most profitable entertainment industries. The ease of access to the online games is augmented by the ubiquitous wireless technology of Wi-Fi allowing users to stay connected at all hours. Some businesses even consider internet connection as a necessity by offering free Wi-Fi access for their customers, which is seen as a smart investment to attract people to enter their premises and boost their profits. An analysis of data obtained from the 4,374 Hungarian online gamers showed that the most famous Massively Multiplayer Online games (MMOs) were role-playing games, first-person shooters, and real-time strategy[3]. One of most popular MMOs with as the most played games in 2021 is Fortnite with an astounding number of 12.3 million concurrent online players. Another online game with massive popularity is League of Legends which is played by around 8 million people worldwide[4].

It was reported by the Malaysian Communications and Multimedia Commission (MCMC) that Malaysian internet users represented approximately 88.7% of the total population in 2020, a 1.3% increase from 87.4% in 2018. Of these, about 34.1% were between 20 – 24 years old and 42.8% of them playing online games[5]. The improvement of technologies over time has boosted the participation of all kinds of generation ranging from children to adults. Because of this, video gaming has been considered as a mainstream entertainment option with consequent growing hours spent on its daily usage that appear to be unperturbed by the COVID-19 restriction. Playing video games may have their own benefits such as improving focus, multitasking, and working memory[6,7]. Online video games typically allow players to compete with other online players in terms of challenging and dominating the games to achieve their goals. In addition, online gaming also lets people to remotely play and socialize with their virtual or real-life friends, other than chatting, bonding, and working as a team. Such enjoyment, on the other hand, might lead to addiction by causing intense compulsion to play on a frequent basis that would eventually cause the player to become obsessive. Furthermore, it can also be accompanied by a myriad of mental and social health conditions to individuals, especially when it is heavily used.

Gaming disorder has been classified as an official mental health disorder and medical illness by the WHO in the 11th Revision of the International Classification of Diseases (ICD-11)[8]. It was defined as a pattern of gaming behavior characterized by impaired control over gaming, increasing priority given to gaming over other activities to the extent that gaming takes precedence over other interests and daily activities, and continuation or escalation of gaming despite the occurrence of negative consequences. Some of the bad effects are sleep quality impairment, obesity, stress, deteriorating work or academic performance and violent behavior. Studies have reported that the addiction might be due to the nature of the game whereby

https://doi.org/10.37231/ajmb.2024.8.1.706
https://journal.unisza.edu.my/ajmb

the players are entangled in the rewarding cycle which led to another cycle in a compulsion loop. It was also demonstrated that there is a positive correlation between addictive behavior (pertaining to video gaming, alcohol consumption, gambling disorder) and emotion regulation, in a way that some people may possess the behavior to avoid negative feelings in their lives[9]. In some countries like Taiwan, China and South Korea, individuals with such disorder have been enrolled in the treatment for mental illness to treat their addiction[10]. Although many studies have been performed to explore the numerous effects of gaming on people's social and mental health, limited research with regards to their findings during the unprecedented pandemic was available. Therefore, the aim of this study is to determine the level of video gaming addiction during COVID-19 pandemic particularly among the online video gamers in Malaysia.

Materials and Methods

Study design and setting

This cross-sectional study was conducted using an online survey. Ethical approval from the UiTM Research Ethics Committee was obtained prior to study commencement (approval code REC/04/2020 (UG/MR/132)). Participants were recruited from the pharmacy student population in UiTM Puncak Alam via convenience sampling who were willing to answer the survey and fit into the inclusion criteria: (1) aged 18 years old and above; (2) playing online video games (3) living in Selangor and (4) able to read in English or Malay. Based on the Epi Info 7 software calculator, the required sample size was 231 with a non-response rate of 30%, giving the minimum sample size of 300 (power = 80%, α = 0.05, 95% confidence level). The inform consent form was enclosed on the first page of the questionnaire which contained the title, description, and purpose of the study to emphasize confidentiality of the respondents. The statements were written in English and Malay to ensure that respondents could understand the statements and instructions, able to fill up the questionnaire at their comfort, and most importantly give valid responses.

Study instrument

The questionnaires used in this study were modified and based on a comprehensive literature review pertaining to the DSM-IV criteria for Internet Gaming Disorder[11–13]. The items from Section D were drafted from published literatures by Wu et al.[14] and Yildiz et al.[15] Three lecturers who are experts in the field of social pharmacy and online addiction reviewed the draft and provided feedback for improvement including the questionnaire items relevance, clarity and conciseness. Minor amendments were made accordingly. The revised instrument was pilot tested using 30 samples to test its validity and reliability. The Cronbach alpha coefficient was computed to measure the internal consistency of the instrument, which was 0.828 and considered as acceptable. The final questionnaire comprised of three sections: (1) Section A: Demographic details such as age, gender and household income; (2) Section B: Frequency of playing video games; (3) Section C: 7-Item Game Addiction Scale (GAS) and Section D: Purpose of playing video games. Each question in the Section C were intended to measure gaming addiction tendencies that is preceded with the phrase "In the last 6 months, have you…" and scored with a 5-point Likert scale (1 = never, 2 = rarely, 3 = sometimes, 4 = often, and 5 = very often). Participants who scored "sometimes" or more on all seven items were defined as monothetic gamers ("pathological gaming"), and those who scored "sometimes" or more on at least half of the items (four to six of seven items) were defined as polythetic gamers (excessive gaming). In Section D, the participants were asked to identify the listed reason for playing video games and rate their answer on each item using a 5-point Likert scale (1 = strongly disagree, 2 = agree, 3 = neutral, 4 = agree, and 5 = strongly agree).

Data collection and analysis

The data collection was carried out using the survey created from Google Forms and distributed online to the participants via a direct shared link to the form. This study was conducted from April until June 2020

https://doi.org/10.37231/ajmb.2024.8.1.706
https://journal.unisza.edu.my/ajmb

in the lockdown period during the MCO period in this country. The survey distribution was carried out via social media platforms including Facebook, Telegram, Twitter, WhatsApp and Instagram. Participants were asked to spend approximately ten to fifteen minutes to answer the questionnaire. Continuous data were presented as mean ± SD, and categorical data were expressed as numbers with percentages. All statistical analysis was conducted using IBM Statistical Package for Social Sciences (SPSS) version 26. The t-test and one-way ANOVA test were used to test the difference in cumulative GAS scores based on respondent demographics, household monthly income and time spent on playing games. All statistical tests were two-tailed and maintained a significance level ($p \leq 0.05$) and a confidence interval of ≥ 95%.

Results

A total of 301 respondents were included in this study with a response rate of 56%, consisting of 182 (60.5%) females and 119 males (39.5%) as shown in Table 1. The average age of the participants in the study was 23.46 ± 3.64 years where the majority of them were between 22 to 30 years old (n = 184, 61.1%). The minimum and maximum ages were 18 and 40 years, respectively. With regards to the household income, most of the participants (124, 41.2%) had an income of below RM 4,000 whereas only 43 (14.3%) of them received more than RM 10,000 per month. The findings showed that on average, these video gamers played approximately 2.33 ± 1.83 hours daily or 3.82 ± 2.04 days weekly. Although many of them admitted to generally playing video games for either less than an hour (n = 100, 33.2%) or between 1 – 2 hours per day (n = 108, 35.9%), many of them would play more than five days per week (n = 107, 35.5%).

Table 1: Association between sociodemographic characteristics of participants and time spent playing online games with their mean GAS scores.

	Frequency (%)	Mean (SD)	Mean GAS score (Mean ± SD)	*P*
Gender				
Male	119 (39.5%)		0.63 ± 0.23	0.0001*#
Female	182 (60.5%)		0.64 ± 0.22	
Age				
18 – 21 years old	111 (36.9%)	23.46	0.68 ± 0.23	0.262&
22 – 30 years old	184 (61.1%)	(± 3.64)	0.60 ± 0.22	
Above 30 years old	6 (2.0%)		0.64 ± 0.15	
Household monthly income				
Below RM 4,000	124 (41.2%)		0.62 ± 0.23	0.324&
RM 4,001 – 8,000	83 (27.6%)		0.65 ± 0.22	
RM 8,001 – 10,000	51 (16.9%)		0.60 ± 0.22	
Above RM 10,000	43 (14.3%)		0.67 ± 0.20	
Hours per day spent on playing online games				
Less than 1 hour	100 (33.2%)	2.33	0.47 ± 0.17	0.0001*&
1 – 2 hours	108 (35.9%)	(± 1.83)	0.66 ± 0.19	
3 – 4 hours	63 (20.9%)		0.72 ± 0.17	
5 – 6 hours	18 (6.0%)		0.83 ± 0.22	
More than 7 hours	12 (4.0%)		0.97 ± 0.12	
Days per week spent on playing online games				
1 day	73 (24.3%)	3.82	0.44 ± 0.14	0.0001*&
2 – 3 days	54 (17.9%)	(± 2.04)	0.57 ± 0.16	

https://doi.org/10.37231/ajmb.2024.8.1.706
https://journal.unisza.edu.my/ajmb

4 – 5 days	67 (22.3%)	0.69 ± 0.20
More than 5 days	107 (35.5%)	0.76 ± 0.19
Pathological GAS score		
Monothetic gamers	9 (2.99%)	
Polythetic gamers	44 (14.62%)	

* Statistically significant (p ≤ 0.05), # Independent t-test, & ANOVA test

The statistical analysis showed that there is a statistically significant difference between the mean GAS scores and the participants' gender (p = 0.0001), number of hours per day (p = 0.0001) and number of days per week (p = 0.0001) spent on playing video games. Nonetheless, the difference between mean GAS scores and age group as well as household monthly income are not statistically significant. Based on our findings, the GAS scores for nearly all items are skewed mainly to the right. Longer playing time (i.e., 3 to 7 hours or more every day) was revealed to be in parallel with a higher mean GAS score, and similar results were observed with those who played longer days (4 to 5 days or more every week). According to the GAS classification based on Lemmens et al.[13], our data showed a low prevalence of addicted gamers. Only about 9 (2.99%) and 44 (14.62%) of the participants were considered pathologic subjects or addicted based on their monothetic and polythetic GAS scores.

The results from GAS survey are shown in Table 2 for the 7-item diagnostic criteria for pathological gaming addiction. Our findings demonstrated that only a small percentage of the participants answered "very often" to all 7 GAS scale items except Item 2 (tolerance). The majority of them also answered to have never had any experience with regards to Item 3 (mood modification), Item 5 (withdrawal), Item 6 (conflict) and Item 7 (problems). The reasons for playing video games among the participants are shown in Table 3. There were only 2 (0.66%) participants who strongly disagreed with the motion of playing video games for amusement purposes, while most of them strongly agreed (n = 136, 45.18%). Surprisingly, there were more gamers who played due to the attractive game storyline (n = 87, 28.90%) and for the sake of playing online games with their real friends (n = 71, 23.59%). In addition, many had also resorted to play as an outlet to relax or unwind themselves from the real world (n = 110, 36.54%).

Table 2: Prevalence of 7-Item Game Addiction Scale

GAS Scale Item	Never n (%)	Rarely n (%)	Sometimes n (%)	Often n (%)	Very often n (%)
Item 1: Salience Have you thought all day long about playing video?	68 (22.6 %)	77 (25.6%)	67 (22.3%)	60 (19.9%)	29 (9.6%)
Item 2: Tolerance Have you played video games longer than intended?	45 (15%)	47 (15.6%)	61 (20.3%)	95 (31.6%)	53 (17.6%)
Item 3: Mood modification Have you played video games to forget about real life?	79 (26.2%)	52 (17.3%)	56 (18.6%)	72 (23.9%)	42 (14.0%)

https://doi.org/10.37231/ajmb.2024.8.1.706
https://journal.unisza.edu.my/ajmb

Item 4: Relapse Have others successfully tried to reduce your time spent on video games?	82 (27.2%)	69 (22.9%)	86 (28.6%)	46 (15.3%)	18 (6.0%)
Item 5: Withdrawal Have you felt upset when you were unable to play video games?	102 (33.9%)	86 (28.6%)	62 (20.6%)	36 (12.0%)	15 (5.0%)
Item 6: Conflict Have you had arguments with others over your time spent on playing video games?	130 (43.2%)	76 (25.2%)	51 (16.9%)	30 (10.0%)	14 (4.7%)
Item 7: Problems Have you neglected important activities to play video games?	117 (38.9%)	82 (27.2%)	51 (16.9%)	39 (13.0%)	12 (4.0%)

Table 3: Purpose of playing video games during pandemic

Purpose of playing	**Strongly disagree n (%)**	**Disagree n (%)**	**Neutral n (%)**	**Agree n (%)**	**Strongly agree n (%)**
For amusement	2 (0.7%)	16 (5.3%)	46 (15.3%)	101 (33.6%)	136 (45.2%)
To gain distraction	69 (22.9%)	61 (20.7%)	71 (23.6%)	65 (21.6%)	35 (11.6%)
Attractive game storyline	46 (15.3%)	54 (17.9%)	64 (21.3%)	87 (28.9%)	50 (16.6%)
To play with real friends	68 (22.6%)	55 (18.3%)	53 (17.6%)	71 (23.6%)	54 (17.9%)
To socialize with virtual friends	92 (30.6%)	65 (21.6%)	57 (18.9%)	67 (22.3%)	20 (6.6%)
For relaxation	19 (6.3%)	32 (10.6%)	65 (21.6%)	110 (36.5%)	75 (24.9%)

Discussion

The present study aimed to identify the online video gaming addiction among the video gamers in Malaysia. The relationship between the gaming addiction and demographic background as well as time spent playing video games were analyzed using the gaming addiction scale developed by Lemmens et al[13]. The mean GAS scores between male and female participants are almost similar, indicating that gender does not play a role in causing potential addiction to online gaming. This is in contrast with other earlier studies, which suggested that males have an increased tendency to develop the disorder. A study among medical students in Malaysia observed that the male respondents were about 1.8 times more likely to develop internet addiction in comparison with female respondents. On the other hand, a systematic review by Paulus et al.[16]

https://doi.org/10.37231/ajmb.2024.8.1.706
https://journal.unisza.edu.my/ajmb

revealed that the internet gaming disorder were higher in male adolescents aged 12 to 20 years. The global gaming disorder rates were found to be about 2.5:1 in favor of males compared to females as reported by Stevens et al.[17] However, previous studies did not take into account the circumstances of the samples involved, as our respondents were specifically enrolled under the pandemic situation.

Overall, the participants involved in this study were largely young adults whose household monthly income was below RM 4,000. Based on the Malaysian household income classification by the Department of Statistics Malaysia, any family or members of household with total incomes received per month of RM 4,850 or below can be classified as the Bottom 40% (B40), or lower income group[18]. Although the cost of owning video gaming consoles conventionally used to be a major obstacle within families with low socioeconomic status, video games nowadays can be played from anywhere and at any place using a variety of devices either a home console, personal computer, smartphone or even tablet.

Despite the fact that many Malaysians has been driven to lower-income categories due to income reduction and loss of employment by the COVID-19 pandemic, this does not deter these young adults to entertain themselves by playing online video games. The eSports market is one of the least suffering businesses in the market amid the pandemic situation. For example, a 75% increase in video game usage has been reported during peak hours according to the report by Verizon, a US-based telecommunications provider[19]. There were also reports regarding the surge in online traffic of up to 70% in Italy, contributed from popular MMOs such as Fortnite and Call of Duty during the enforced mass quarantine at the early stage of the coronavirus outbreak[20].

Our findings also revealed that many of the respondents would consistently spend their time for at least an hour per day playing video games and even for more than 5 days every week. In a published survey report by the Organization for Economic Co-operation and Development (OECD): Risks That Matter 2020, approximately 51% of people aged between 18 to 29 years old have either experienced job loss, reduction in working hours and/or pay cut, or even put on unpaid leave for an unknown period due to COVID-19[21]. Apart from the economic pressure, the effect of pandemic-related quarantine and lockdown could result in post-traumatic stress symptoms (PTTS)[22]. These include mental health problems such as depression, low mood, irritability, insomnia and emotional exhaustion. Being forced into isolation at home can bring about various challenges and burdens to physical and mental health, so much so that playing online video games could be a way of channelling out their stress by interacting remotely with their friends.

Based on our results, only a small percentage (2.99 % monothetic) of the participants were classified as addicted gamers in spite of the consistent playing hours amid the lockdown period. This is supported by a similar study by Ting and Essau where the increased use of online gaming activities did not result in pathological or addicted gamers during COVID-19 pandemic[23]. The low prevalence rate is also similar to the report by Achab et al. whereby approximately 10 – 15 % of young people were considered as excessive gamers in East and South-East Asian countries[24]. However, these results are in contrast with the meta-analytic review by Chia et al. that observed higher prevalence rates in Southeast Asia such as Malaysia, Philippines, Thailand, Singapore, and Vietnam[25]. Contrary to the global prevalence of gaming disorder of 3.05% as reported by Stevens et al. in their meta-analysis, their findings revealed that the pooled prevalence rate for internet addiction and gaming disorders were 20.0% and 10.1%, respectively[17]. The discrepancy between these reports could be attributable to the low number of samples involved and the difference in geographical locations of the other studies.

https://doi.org/10.37231/ajmb.2024.8.1.706
https://journal.unisza.edu.my/ajmb

Playing games were merely considered as a method of self-control, especially by the university students who were either advised to return home or stranded in the university residencies because of MCO. A qualitative survey in this country found that most of the respondents consisting of Malaysian college students were engaged in video games or watching movies to maintain their composure under self-quarantine[26]. This is also in agreement with our discovery where most of the participants in this study opted to play as a form of escapism, and solely for the purpose of relaxation and amusement. An earlier report which studied excessive online gaming, and its psychological predictors also supported this notion. The results suggested that the players are more motivated to spend their time online when they suffer from negative outcomes as a coping strategy, without necessarily labelling it as a compulsive behavior[27]. Nonetheless, there have been some growing concerns pertaining to physical health. For instance, the physical inactivity caused by persistent sitting position while playing mobile video games can be associated with negative impact on physical health among these populations such as low back pain[28], hypertension[29,30], obesity[31] and diabetes[32]. Therefore, it is highly suggested that active video games or exergaming should be better encouraged to minimize the risk of developing chronic diseases associated with sedentary behavior and maintain physical fitness. Our results, however, provided limited information pertaining to the type of games used by the respondents. Future studies should be focused on gaining a wider sample population and distinguishing the different types of online games involved to better facilitate the understanding the video gaming usage among young adults in the country.

Conclusion

As society works together to prevent the spread of coronavirus and people are forced into travel restrictions as well as stricter movements around the world, online gaming has become a social lifeline to connect people virtually together at a distance. In a nutshell, video game usage in moderation can assist individuals to embrace the new norms. While it is important to watch for warning signs of problematic gaming, our findings indicated that it is also vital to recognize its advantages especially during the current COVID-19 crisis. This study revealed that the prevalence of pathological and excessive gamers was low among the university students even during the pandemic restriction. Playing video games are seen as a remedy to relieve stress and provide an enjoyable means of maintaining social interaction with their friends in order to escape from the negative effects of lockdown.

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

References

1. Mohammed AH, Suhaimi AM, Hassan BAR. COVID-19 variants, available treatments, and vaccinations: An overview study. Al-Rafidain J Med Sci (ISSN 2789-3219). 2021;1. doi:10.54133/ajms.v1i.42
2. Tang KHD. Movement control as an effective measure against Covid-19 spread in Malaysia: an overview. J Public Heal. Published online 2020:17-20. doi:10.1007/s10389-020-01316-w
3. Nagygyörgy K, Urbán R, Farkas J, et al. Typology and Sociodemographic Characteristics of Massively Multiplayer Online Game Players. Int J Human–Computer Interact. 2013;29(3):192-200. doi:10.1080/10447318.2012.702636
4. McCormack S, Jones B, Elliott D, Rotheram D, Till K. Coaches' Assessment of Players Physical Performance: Subjective and Objective Measures are needed when Profiling Players. Eur J Sport Sci.

2022;22(8). doi:10.1080/17461391.2021.1956600
5. Wong SM, Leong CM, Puah CH. Mobile internet adoption in Malaysian suburbs: The moderating effect of gender. Asian J Bus Res. 2019;9(3). doi:10.14707/ajbr.190069
6. Von Der Heiden JM, Braun B, Müller KW, Egloff B. The association between video gaming and psychological functioning. Front Psychol. 2019;10:1731.
7. Johannes N, Vuorre M, Przybylski AK. Video game play is positively correlated with well-being. R Soc Open Sci. 2021;8(2). doi:10.1098/rsos.202049
8. Rebello T, Reed G, Saxena S. Core considerations in the development of the world health organization's international classification of diseases, 11 th Revision . Indian J Soc Psychiatry. 2018;34(5). doi:10.4103/ijsp.ijsp_43_18
9. Wang Q, Ren H, Long J, Liu Y, Liu T. Research progress and debates on gaming disorder. Gen psychiatry. 2019;32(3).
10. King DL, Delfabbro PH, Griffiths MD, Gradisar M. Assessing clinical trials of Internet addiction treatment: A systematic review and CONSORT evaluation. Clin Psychol Rev. 2011;31(7):1110-1116.
11. Koga Y, Kawashima D. Development and Validation of Japanese Version of the Game Addiction Scale for Adolescents. Japanese J Personal. 2018;27(2). doi:10.2132/personality.27.2.10
12. Paschke K, Sack PM, Thomasius R. Validity and psychometric properties of the internet gaming disorder scale in three large independent samples of children and adolescents. Int J Environ Res Public Health. 2021;18(3). doi:10.3390/ijerph18031095
13. Lemmens JS, Valkenburg PM, Peter J. Development and validation of a game addiction scale for adolescents. Media Psychol. 2009;12(1):77-95. doi:10.1080/15213260802669458
14. Wu AMS, Lei LLM, Ku L. Psychological needs, purpose in life, and problem video game playing among Chinese young adults. Int J Psychol. 2013;48(4). doi:10.1080/00207594.2012.658057
15. Yildiz Durak H, Haktanir A, Saritepeci M. Examining the Predictors of Video Game Addiction According to Expertise Levels of the Players: The Role of Time Spent on Video Gaming, Engagement, Positive Gaming Perception, Social Support and Relational Health Indices. Int J Ment Health Addict. Published online 2023. doi:10.1007/s11469-023-01073-3
16. Paulus FW, Ohmann S, von Gontard A, Popow C. Internet gaming disorder in children and adolescents: a systematic review. Dev Med Child Neurol. 2018;60(7):645-659. doi:10.1111/dmcn.13754
17. Stevens MWR, Dorstyn D, Delfabbro PH, King DL. Global prevalence of gaming disorder: A systematic review and meta-analysis. Aust New Zeal J Psychiatry. 2020;55(6):553-568. doi:10.1177/0004867420962851
18. Tafran K, Tumin M, Osman AF. Poverty, income, and unemployment as determinants of life expectancy: Empirical evidence from panel data of thirteen Malaysian States. Iran J Public Health. 2020;49(2). doi:10.18502/ijph.v49i2.3092
19. King DL, Delfabbro PH, Billieux J, Potenza MN. Problematic online gaming and the COVID-19 pandemic. J Behav Addict. 2020;9(2):184-186. doi:10.1556/2006.2020.00016
20. Navarro J. Fortnite: a context for child development in the US during COVID-19 (and beyond). J Child Media. 2021;15(1):13-16.
21. Solomou I, Constantinidou F. Prevalence and predictors of anxiety and depression symptoms during the COVID-19 pandemic and compliance with precautionary measures: Age and sex matter. Int J Environ Res Public Health. 2020;17(14). doi:10.3390/ijerph17144924
22. Brooks SK, Webster RK, Smith LE, et al. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. Lancet. 2020;395(10227):912-920. doi:10.1016/S0140-6736(20)30460-8
23. Chuong Hock T, Essau C. Addictive Behaviours among University Students in Malaysia during COVID-19 Pandemic. Addict Behav Reports. Published online 2021:100375.

doi:10.1016/j.abrep.2021.100375

24. Achab S, Meuli V, Deleuze J, et al. Challenges and trends of identification and treatment of disorders associated with problematic use of Internet. Proc from 1rst Act World Heal Organ Congr Public Heal Implic Behav Addict Assoc with excessive use Internet, Comput smart phones similar Electron devices. 2014;15(15):31-59.
25. Chia DXY, Ng CWL, Kandasami G, et al. Prevalence of internet addiction and gaming disorders in southeast Asia: A meta-analysis. Int J Environ Res Public Health. 2020;17(7):0-17. doi:10.3390/ijerph17072582
26. Mohammed AA, Uddin MS, Saidi AM. Covid-19 And Movement Control Order: Stress and Coping Strategies of Students Observing Self-Quarantine. Int J Acad Res Bus Soc Sci. 2020;10(5):788-802. doi:10.6007/ijarbss/v10-i5/7249
27. Kardefelt-Winther D. Problematizing excessive online gaming and its psychological predictors. Comput Human Behav. 2014;31(1):118-122. doi:10.1016/j.chb.2013.10.017
28. Yao JPR, Sundar V, Ramalingam V. Predictors of mobile video gaming on musculoskeletal pain among university students in selangor, malaysia. Rev Pesqui em Fisioter. 2021;11(3). doi:10.17267/2238-2704RPF.V11I3.3916
29. Mohammed AH, Hassan BAR, Suhaimi AM, Ali AHHD. Hypertension knowledge, awareness, and attitude among the hypertensive population in Kuala Lumpur and rural areas in Selangor, Malaysia. J Public Health (Bangkok). Published online 2019. doi:10.1007/s10389-019-01160-7
30. Mohammed AH, Hassan BAR, Suhaimi AM, Blebil A, Dujaili J. Factors associated with the level of knowledge about hypertension in Malaysia: A short communication. J Pharm Heal Serv Res. 2020;11(4):415-417.
31. Thorne HT, Smith JJ, Morgan PJ, Babic MJ, Lubans DR. Video game genre preference, physical activity and screen-time in adolescent boys from low-income communities. J Adolesc. 2014;37(8):1345-1352. doi:10.1016/j.adolescence.2014.09.012
32. Sahudin S, Hussain M, Ghaffar NFA, Suhaimi AM. A diabetes and obesity crisis: Preliminary study of lifestyle, diet, knowledge and attitude of Malaysian pharmacy undergraduates towards type-2 diabetes. J Pharm Nutr Sci. 2017;7(4):172-182.