



Online Game Addiction and the Level of Depression Among Adolescents in Manila, Philippines

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Vol. 9, No. 1 (2020) | ISSN 2166-7403 (online)
DOI 10.5195/cajgh.2020.369 | <http://cajgh.pitt.edu>



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Abstract

Introduction: World Health Organization recognizes online game addiction as a mental health condition. The rise of excessive online gaming is emerging in the Philippines, with 29.9 million gamers recorded in the country. The incidence of depression is also increasing in the country. The current correlational analysis evaluated the association between online game addiction and depression in Filipino adolescents.

Methods: A paper-and-pencil self-administered questionnaire assessing depression and online game addiction was distributed from August to November, 2018. The questionnaire included socio-demographic profiles of the respondents, and the 14-item Video Game Addiction Test (VAT) (Cronbach's $\alpha=0.91$) and the Patient Health Questionnaire-9 (Cronbach's $\alpha=0.88$) to determine levels of online game addiction and depression, respectively. Multiple regression analyses were used to test the association between depression and online game addiction.

Results: Three hundred adolescents (59% males, 41% females) participated in the study. Fifty-three out of 300 respondents (12.0% males, 5.7% females) had high level of online game addiction as reflected in their high VAT scores. In this study, 37 respondents (6.7% males, 5.7% females) had moderately severe depression and 6 (2.0%) females had severe depression. Online game addiction was positively correlated with depression in this study ($r=0.31$; $p<0.001$). When multiple regression analysis was computed, depression was found to be a predictor of online game addiction (*Coefficient*=0.0121; 95% CI-8.1924 - 0.0242; $p=0.05$).

Conclusion: Depression, as associated with online game addiction, is a serious threat that needs to be addressed. High level of online game addiction, as positively correlated to the rate of depression among adolescents in Manila, could potentially be attributed to the booming internet industry and lack of sufficient mental health interventions in the country. Recommended interventions include strengthening depression management among adolescents and improving mental health services for this vulnerable population groups in schools and within the communities.

Keywords: *Mental health; Public health; Addiction; Video games; Depression; Neuroscience*

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Research

Based on the report of the European Mobile Game Market in 2016, there were more than 2.5 billion video gamers across the globe.¹ Several studies have found that the majority of these players were adolescents aged 12-17 years,²⁻⁵ with more usage among males than females.⁶ In 2017, newzoo.com reported that the active gamers in the Philippines were 52% males and 48% females.⁷ In the US, 60% of the video gamers were males and 40% are females.⁶ Studies have shown that there are similarities between males and females in regard to choice of games, behavior toward video gaming, and motives for engaging in this activity.⁸ Some of the reported reasons to engage in video games include having fun and for recreation,⁹⁻¹⁰ to de-stress,¹¹⁻¹² and to avoid real life issues.¹³⁻¹⁴ The prevalence of video gaming

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Central Asian Journal of Global Health

Volume 9, No. 1 (2020) | ISSN 2166-7403 (online) | DOI 10.5195/cajgh.2020.369 | <http://cajgh.pitt.edu>

addiction varies from region to region based on the socio-cultural context and the criteria used for the assessment.¹⁵ However, it is well established that video gaming is addictive,¹⁶⁻¹⁸ and there is clinical evidence for the symptoms of biopsychosocial problems among video game addicts.¹⁹ It is a serious threat to the mental and psychosocial aspects of an individual, as it lead to stress, loss of control, aggression, anxiety, and mood modification.²⁰⁻²¹

In the Philippines, online gaming is an emerging industry. The country ranks 29th in game revenues across the globe. In 2017, there were more than 29.9 million gamers recorded in the country. Most of the gamers were 21-35 years of age, followed by the adolescents 10-20 years of age.⁷ Adolescents accounted for 30.5% of the total population in the country.²² In general, this age group is already facing mental health issues, such as anxiety, mood disorders, and depression. This concern gets more alarming as rates of suicide among high school and college students are growing worldwide.²³

World Health Organization lists video game addiction as a mental health problem.²⁴ Psychiatric research reported evidence on the links between depression and video game addiction. Among the findings are MRI scans of video game addicts showing disruption of some brain parts and overriding of the 'emotional' part with the 'executive' part.²⁵ A study in China has also reported that gamers are at increased risk of being depressed in comparison to those who did not play video games.²⁶ In the field of neuroscience, depression caused by online game addiction is explained as a reduction of synaptic activities due to permanent changes in the dopaminergic pathways. This means that long exposure to online gaming causes changes in a person's sense of natural rewards, often making activities less pleasurable. This neuroadaptation is also associated with chronic depression.²⁷

There is a paucity of studies on video game addiction in the Philippines, making its implications not well understood. There are reports of the impact of video

game addiction on the academic performance of the gamers,²⁸⁻³⁰ but no study has been found associating video game addiction and depression in the Philippine setting. Based on the 2004 report from the Department of Health in the Philippines, over 4.5 million cases of depression were reported in the country. Recently, World Health Organization reported that 11.6% of the 8,761 surveyed young Filipinos considered committing suicide; 16.8% of them (of 8,761) had attempted it.³¹ This phenomenon is said to be instigated by several factors, including the individual's exposures to technology. Video game addiction and depression are two emerging public health issues among adolescents in the Philippines.³¹⁻³² This small-scale study aims to understand the association between these two factors and produce baseline information that can be used in formulating evidence-based public health policies in the country.

Methods

Research site and participants

This study was conducted in the months of August-November 2018 in the city of Manila, the capital of the Philippines. Manila is situated on the eastern shores of Manila Bay, on the western edge of Luzon (14°35'45"N 120°58'38"E). It is one of the most urbanized areas and the center of technological innovation in the country. It has a population of 1.78 million, based on 2016 census.³³ Manila covers 896 barangays (villages), which are grouped into six districts. Based on the 2010 census, the total population of Filipino adolescents, regardless of sex, was 166,391.³⁴ This population estimate was used for computing the sample size needed for this study. Sample size calculation was estimated using the online calculator from OpenEpi.³⁵ The completion rate of the questionnaires was 78.13%, for a total of 300 consenting respondents who were all online video gamers. They were selected if they were residents of Manila City and reported playing video games on the regular basis.

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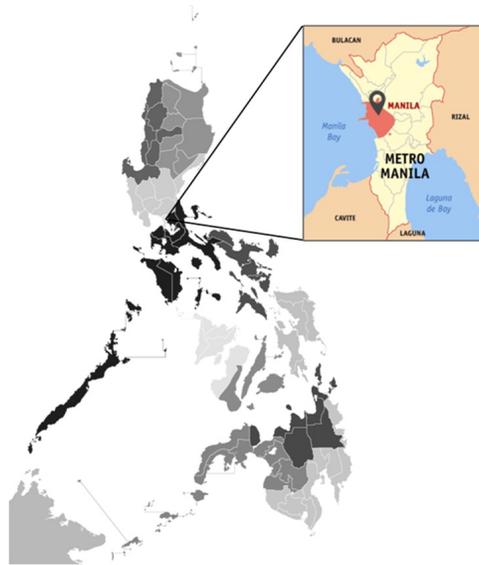


Figure 1. Map of Manila from the National Capital Region of the Philippines

Instruments

The study used a paper-and-pencil self-administered questionnaire. To determine the level of online game addiction of the respondents, the study used the Video Game Addiction Test (VAT) developed by van Rooij *et al.*³⁶ from the 14-item version of the Compulsive Internet Use Scale (CIUS).³⁷ VAT was utilized in several studies among adolescents in the past, and it has demonstrated excellent reliability and validity. The scale outcomes were found to be comparable across gender, ethnicity, and learning year, making it a helpful tool in studying video game addiction among various subgroups.³⁶ The survey contains questions in five categories: loss of control, conflict, salience, mood modification, and withdrawal symptoms. Each question was measured on a 5-point scale: 0–never to 4–very often. The results were then used as an indicator of the level of addiction. This study adapted the calculations conducted by van Rooij *et al.*³⁸ wherein the average scale scores of all the respondents were arranged from 0-4 and then were divided into two groups. The first group had an average of 0-2 or 'never' to 'sometimes', while the second group had an average of 3-4 or 'often' to 'very often'. The

latter group was considered to have the highest level of problematic gaming or, in this study, with online game addiction.³⁸ The internal reliability of the VAT in this study was excellent at Cronbach's α of 0.91.

The level of depression of the respondents was determined by using the Patient Health Questionnaire-9 (PHQ-9).³⁹ It is a 9-item depression module taken from the full PHQ. The questionnaire allows the respondents to rate their health status in the past six weeks. There are 9 diagnostic questions in which the respondents rated 0 for 'not at all', 1 for 'several days', 2 for 'more than half the days', and 3 for 'nearly every day'. The total of the PHQ-9 scores was used to measure severity of depression. Since there are 9 items in the questionnaire and each question can be rated from 0-3, the PHQ-9 scores can range from 0-27. The score was interpreted as 'no depression' (0-4 points), 'mild depression' (5-9 points), 'moderate depression' (10-14 points), 'moderately severe depression' (15-19 points), and 'severe depression' (20-27 points).³⁹ In this study, the internal reliability of PHQ-9 had a Cronbach's α of 0.88.

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Central Asian Journal of Global Health

Volume 9, No. 1 (2020) | ISSN 2166-7403 (online) | DOI 10.5195/cajgh.2020.369 | <http://cajgh.pitt.edu>

Data gathering procedure

The study randomly surveyed gamers in various parts of Manila. Since there are no reliable records of the gamers in the area available for research, various sampling techniques were utilized. A convenience sampling was done by visiting internet cafes in the city and requesting the gamers to answer the questionnaire during their time-out (from the game). A verbal consent was provided by each respondent after hearing a brief explanation of the research objectives and the necessary instructions. While answering the questionnaire, the respondents were assisted by the investigator for any clarifications and questions. The questionnaire was completed by the respondents in approximately 2.5 minutes. Other procedures included snowball sampling, accidental, and voluntary response sampling after the distribution of invitation to respond among internet cafes, gamers' social media groups/sites, and online gamers' organizations. The study was approved by the ethical board of the Polytechnic University of the Philippines.

Statistical analysis

All the responses from the questionnaires were inputted into MS Excel and into SPSS version 23.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics of responses were computed and included the frequencies

(f), percentages (%), averages (\bar{x}) and standard deviations (SD). The association between online game addiction and depression was analyzed using Pearson's correlation and was further analyzed using a multiple regression analysis. The study hypothesized that there is no significant correlation between online game addiction and level of depression among adolescents in the City of Manila, Philippines. All statistical results were considered significant at the p value <0.05 .

Results

Profile of the respondents

A total of 300 consenting adolescents participated in the study. There were more males ($n=176$; 59%) than females ($n=124$; 41%) who participated in the study. Most of the respondents were adolescents (aged less than 19 years), except for the six respondents who were already 20 years old during the data gathering. The mean age of the participants was 17 years old (SD=0.90). Figure 2 presents the profiles of the respondents based on their gender and age characteristics. The VAT analysis shows that there were more males (12.0%) who were addicted to online games than females (5.7%). Meanwhile, 15-, 17-, and 18-year old respondents had the highest VAT scores among the six age groups.

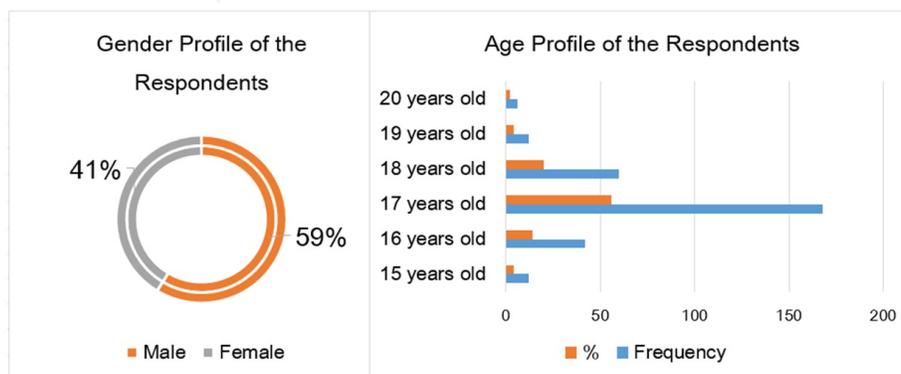


Figure 2. Profiles of the respondents based on gender and age

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Level of online game addiction

The 14-item VAT was ranked from the highest to the lowest mean score to understand the common conditions experienced by the respondents. The item with the highest mean was No. 13: *Do you game because you are feeling down?* ($\bar{x}=2.1$, $SD=1.40$). This question had the third greatest number of “4-very often” ratings ($N=46/300$). It was followed by the item No. 3: *Do others (e.g., parents or friends) say you should spend less time*

on games? ($\bar{x}=2.06$, $SD=1.41$). The third item with the highest mean score was item No. 7: *Do you look forward to the next time you can game?* ($\bar{x}=2.0$, $SD=1.27$). The item with the highest number of “4-very often” rating was item No. 14: *Do you game to forget about problem?* ($N=67/300$). Items 12 and 2 also had high mean scores: *Do you neglect to do your homework because you prefer to game?* (Item 12; $\bar{x}=1.98$, $SD=1.34$); and *Do you continue to use the games despite your intention to stop?* (Item 2; $\bar{x}=1.84$, $SD=1.20$).

Profiles	Overall Profile		Respondents with high VAT scores ^a		Respondents with high VAT scores ^b	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Gender						
Male	176	58.7	36	12.0	36	20.5
Female	124	41.3	17	5.7	17	13.7
Age						
15 years old	12	4.0	3	1.0	3	25.0
16 years old	42	14.0	3	1.0	3	7.1
17 years old	168	56.0	34	11.3	34	22.0
18 years old	60	20.0	12	4.0	12	20.0
19 years old	12	4.0	1	0.3	1	8.3
20 years old	6	2.0	0	0.0	0	0.0

^aPercentage was computed against the overall number of participants ($N=300$)

^bPercentage was computed against N of each profile of the respondents

Table 1. Levels of online game addiction based on gender and age

Level of depression

The PHQ-9 was used to quantify the symptoms of depression of the respondents and identify its severity. The majority of the respondents demonstrated no depression (47%), followed by having mild depression (22%), and moderate depression (17%). Of note, the current study revealed 12% of the respondents had moderately severe depression and 2% had severe depression. We found that higher PHQ-9 scores were associated with decreased functional status. The most common symptoms reported by the respondents based on

the mean scores of each item in PHQ-9 include ...*feeling tired or having little energy* ($\bar{x}=1.89$, $SD=1.30$), ...*poor appetite or overeating* ($\bar{x}=1.87$, $SD=1.37$), ... *feeling down, depressed or hopeless* ($\bar{x}=1.81$, $SD=1.18$), ...*trouble falling or staying asleep, or sleeping too much* ($\bar{x}=1.78$, $SD=1.33$), and ...*trouble concentrating on things, such as reading newspaper or watching television* ($\bar{x}=1.75$, $SD=1.40$). Interestingly, the six respondents who were identified to have “severe” depression were all females, and four of them had high VAT scores.

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Profiles	No Depression N (%)	Mild N (%)	Moderate N (%)	Moderately Severe N (%)	Severe N (%)
Gender					
Male	87 (29.0)	38 (12.7)	31 (10.3)	20 (6.7)	0 (0.0)
Female	54 (18.0)	28 (9.3)	19 (6.3)	17 (5.7)	6 (2.0)
Age					
15 years	5 (1.7)	1 (0.3)	2 (0.7)	2 (0.7)	0 (0.0)
16 years	24 (8.0)	9 (3.0)	3 (1.0)	7 (2.3)	0 (0.0)
17 years	77 (25.7)	34 (11.3)	31 (10.3)	22 (7.3)	5 (1.7)
18 years	26 (8.7)	17 (5.7)	10 (3.3)	5 (1.7)	1 (0.3)
19 years	5 (1.7)	4 (1.3)	3 (1.0)	1 (0.3)	0 (0.0)
20 years	4 (1.3)	1 (0.3)	1 (0.3)	0 (0.0)	0 (0.0)

Table 2. Level of depression of the respondents based on the PHQ-9 scores

Association between online game addiction and depression

The association between online game addiction based on the VAT scores and the level of depression among the respondents was evaluated through Pearson's correlation analysis. Results (Table 3) show that the level of online game addiction was positively correlated with the level of depression ($r=0.31$, $p<0.001$) but was not significantly correlated with age or gender ($r=-0.80$, $p<0.171$ and $r=0.10$, $p<0.097$, respectively).

A multiple linear regression was calculated to predict online game addiction based on gender and depression. This regression analysis was performed with all participants and with the subset of participants with high VAT scores, which indicated online game addiction. A significant regression equation was found ($F(2.50)=2.247$, 0.10), with an R^2 of 0.082. Table 4 shows that depression was a significant predictor of online game addiction.

Variables	Gender	Age	Online game addiction	Depression
Gender	1	-.080	.100	.070
		.171	.097	.212
Age	-.080	1	-.080	-.020
	.171		.171	.739
Online game addiction	.100	-.080	1	.310
	.097	.171		.000*
Depression	.070	-.020	0.310	1
	.212	.739	.000*	

*significant at $p \leq 0.001$ in correlation matrix

Table 3. Pearson's correlation coefficient among gender, age, online game addiction, and depression of the adolescents in Manila

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Central Asian Journal of Global Health

Volume 9, No. 1 (2020) | ISSN 2166-7403 (online) | DOI 10.5195/cajgh.2020.369 | <http://cajgh.pitt.edu>

Variables	Regression coefficient	95% CI	p value
Adolescents playing online games (N=300)			
Age	-0.0224	-0.1298 - 0.0850	0.68
Depression	0.0418	0.0271 - 0.0565	0.47
Adolescents with addiction playing online games (n=54)			
Age	-0.0443	-0.1305 - 0.0417	0.30
Depression	0.0121	-8.1924 - 0.0242	0.05*

*significant at $p < 0.05$

Table 4. Multiple regression analysis for prediction of online game addiction based on age and level of depression

Discussion

The correlation between online game addiction and the levels of depression in this study was weak but statistically significant. This positive correlation was previously reported in other research studies across the globe.⁴⁰⁻⁴¹ In a study conducted by Rikkers *et al.*⁴⁰ among children and adolescents (11-17 years old) in Australia, electronic gaming was positively associated with emotional and behavioral problems including depression. Longer gaming hours were also associated with severe depressive symptoms, somatic symptoms, and pain symptoms among young people in Taiwan.⁴¹ Online game addiction was associated by Zamani *et al.*⁴² not only with depression but also with sleep disorder, physical complaints, and social dysfunctions of students in Iran. In a study conducted by Dong *et al.*,⁴³ depression came out as one of the outcomes of the internet addiction disorder.

In the current study, most of the respondents looked forward to the next time they would game, with the most common reason of engaging in games reported to be easing the moments of feeling down. Another reason of the respondents' addiction to online games was that they want to forget about problems. It is considered

as one of the core symptoms of addiction as described by Brown.⁴⁴ The second most common experience of the respondents was the 'inability to voluntarily reduce the time spent on online games', which is another core symptom of addiction.⁴⁵ Most of the respondents admitted that they were getting advice from their parents or friends to spend less time on games, but they could not control it, despite their intention to stop. In fact, gaming negatively affected homework completion among many study participants. This effect was previously studied among high school students in Los Baños, Philippines, where the video gamers had 39% probability to fail in school. In this previously published study, 6 out of 10 video gamers spent their daily allowances on computer games, giving them access to continuously spend their time playing.²⁹ The addiction of the adolescents in Manila could have been influenced by the ubiquitous nature of internet in the city. Internet cafes are very accessible in the country, and they are thriving in almost all corners of the city. In addition, the rent for internet and online games in Metro Manila costs 10 to 20 pesos per hour only (US \$0.19 to US \$0.38 per hour), making playing video games affordable. Some internet hubs are even offering discounts and promotions for longer stays of 10-12 straight hours of playing online games.

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Based on the most cited symptoms of the respondents in this study, it could be implied that adolescents cope with their emotional distress by playing online games. This means that the high occurrence of online game addiction goes along with the high occurrence of depression among the same group. In regard to depression, most respondents in this study were feeling tired, having poor appetite, feeling hopeless, having trouble falling asleep, or having trouble concentrating on things that require enough attention, like reading books. These symptoms were also reported by Schmit *et al.*⁴⁵ as related to online game addiction, where the people who spent longer hours playing online games got higher scores for loneliness and isolation. This study did not capture the number of hours spent by the respondents in online games, which could be incorporated in the next study for further analysis.

Depression, as associated to online game addiction, may lead to anxiety, compulsion, and suicide ideations.⁴⁶ This is a serious threat to the population health that needs to be addressed. Interventions may include strengthening depression management among adolescents, either in school or in the community. There are several ways to manage depression. The schools and the community should reinforce sports by making it more challenging, engaging, and motivating. In the Philippines, numerous factors make receiving mental health care a challenge. There is only one psychiatrist for every 250,000 mentally ill patients, budget dedicated to mental health interventions is limited,⁴⁷ a guidance and counseling system has not yet matured,⁴⁸ and there was even a report that online counseling was preferred by the students than its face-to-face counterpart.⁴⁹ The poor availability of the mental health interventions in the country may lead to upsurge of depression cases among adolescents. Meanwhile, the booming online game industry in the country leads to the increased numbers of addicted adolescents to online game addiction. Policy makers, the government, and its stakeholders should start addressing these issues before it becomes an even bigger health concern, especially in the face of ongoing COVID-19 pandemic.

The Philippine government should also assess their existing intervention programs in mental health issues. In 2016, "Hopeline" was launched in the Philippines. It was a national hotline for mental health assistance for the prevention of depression and suicide cases in the country. The hotline is equipped with a professional team of counselors as responders.⁵⁰ No study has been found to assess the effectiveness of this intervention for depression. National trainings and workshop programs have been implemented in other countries to empower the people in dealing with the stigma of depression which includes mental health literacy campaign, peer services, and advocacies.⁵¹ This is an essential step to correct various misconceptions on depression, especially among adolescents.

This study was cross-sectional and cannot determine causality. This is the first report on the association between online game addiction and the levels of depression among adolescents in the city of Manila, Philippines. Despite the small sample and the limited scope of the research, the current study has shown interesting preliminary results that could be instrumental in the conduct of a bigger scale study in the country. To facilitate participation of the larger number of respondents, the future investigators are suggested to coordinate with various high schools in Metro Manila and use these schools as a sampling frame for a robust sampling technique. In this study, the level of online game addiction has no statistically significant association with age and gender. The association between age and online game addiction could have been improved by including older age groups in this study. Data from a group of young adults (college students), who are also exposed to online gaming, could be compared to these data for further analysis. Gender is commonly associated with the level of online game addiction in many studies, but it is not statistically significant in this present study. The sample size in this study was only 300 and may not have been representative enough of a general population. Also, our sample size was not large enough to capture distinctions between males and females. This could also be addressed by a wider scale of surveys in the future research.

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