
Association of internet gaming disorder to depression, anxiety and stress among Filipino adolescents in selected public high schools in Pasay City

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Abstract

Introduction This study determined the relationship of personal factors and gaming factors with Internet Gaming Disorder (IGD). It aimed to provide information on the association of IGD with depression, anxiety, stress and both depression and anxiety among adolescent gamers.

Methods This was an analytic cross-sectional study among 560 14-18-year-old adolescents from two public high schools in Pasay City that used the Internet Gaming Disorder Scale–Short-Form (IGDS9-SF), Depression, Anxiety and Stress Scale-21 items (DASS-21) and gamer profile questionnaires.

Results The prevalence of Internet Gaming Disorder (IGD) was low at 1.1%, while moderate depression was observed in 67%, stress in 46.8%, both depression and anxiety in 64.8%, and high anxiety in 89.3% among adolescents. Using multiple logistic regression to control the effects of possible confounders, the association of IGD with depression (OR 0.971, 95% CI 0.085-11.084, p-value .981), anxiety (OR 6.0x10⁷, p-value .999), stress (OR 6.135, 95% CI 0.373-100.991, p-value .204) and both depression and anxiety (OR 1.027, 95% CI 0.089-11.846, p-value .983) were not statistically significant.

Conclusion The odds of depression, anxiety, stress and both depression and anxiety were higher among those with IGD as compared to those without IGD. However, it is not statistically significant. This study recommended further validation of the new IGD definition in the local setting and longitudinal studies with a larger population to determine other factors associated with mental disorders.

Key words: adolescent, internet, depression, anxiety, stress

There are more than 3.24 billion gamers worldwide based on data for 2023.¹ In Southeast Asia, the prevalence rate of adolescents who use internet online gaming is 29.6% and the Philippines is 3rd highest in this region in terms of number of gamers.² There

are 15.66 million Filipino gamers and majority are young adults.^{1,3}

The growing accessibility of internet technologies such as the usage of the internet for gaming has continuously increased. Studies show that internet gaming has been linked to diseases such as eye strain, early blurring of vision, headaches, overeating and obesity, physical strain on the hands, back and neck, tendons inflammation and articular degeneration in the thumb joint and index fingers, and poor posture (forward head or “poking-chin posture”).^{4,5,6} Internet Gaming Disorder (IGD) is one of the most significant

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psychological conditions and its definition of IGD has changed and was described in the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders.⁷

Studies worldwide have shown a consistently increasing trend in the diagnosis of IGD.⁷ Its prevalence is 1 to 10% in Western countries while an alarming 10 to 15% prevalence rate is reported in Asian countries.^{8,9,10} The prevalence among adolescents in America is 8.5%, 5.5% in Germany and 4.3% in Hungary.^{11,12,13} The prevalence in Hong Kong is 15.6% while 13.8% in Korea.^{14,15} Filipinos also have a similar trend as those reported in other countries. The prevalence of IGD among Filipino internet game players ranges from 10.4% to 54.76%.^{16,17,18,19} The issues are the use of different types of questionnaire tools and the criteria to determine IGD prevalence vary, which cause dissimilar reports. This study adopted the new IGD definition using the criteria of DSM-5-TR, which leads to clearer and comparable data with other research.⁷

Currently, although there is local literature on the prevalence of internet gaming disorder, the studies done locally did not follow the new definition of IGD based on DSM-5-TR of the American Psychiatric Association. Moreover, this study determined the relationship of personal factors and gaming factors with IGD. In addition, this study provides information on the association of IGD with depression, anxiety, stress and both depression and anxiety among adolescent gamers.

Methods

Research Design

An analytical cross-sectional study was conducted in 2 public high schools in Pasay City, Metro Manila, Philippines from March to May 2023. A validated self-administered questionnaire, Internet Gaming Disorder Short Form (IGDSF-9) and Depression Anxiety Stress Scale-21 were distributed to Filipino adolescents in 2 public schools in Pasay City. This study was approved by the UERMMMCI Ethics Review Committee.

Participants

The author included Filipino adolescents engaged in online gaming for more than 12 months enrolled

in public schools in Pasay City, Metro Manila, Philippines who understood either English or Filipino questionnaires and consented to participate. Excluded were those who reported to have been diagnosed with any severe eye problems, epilepsy and developmental disorder such as Autism Spectrum Disorder (ASD), Attention Deficit/Hyperactivity Disorder (ADHD), Major Depressive Disorder (MDD). Also, excluded were adolescents who were into online gambling, use non-networked video and personal computer gaming.

Using OpenEpi version 3 online software, the sample size was computed. A minimum sample size of 491 Filipino adolescents aged 14 to 18 years in the selected public high schools in Pasay City were needed. In this study of Grade levels 8 to 12 students, the selection procedure within each of these strata was random.

Measures

The researcher used 3 self-administered survey forms: 1) Participant's profile that includes the sociodemographic factors, family factors and gaming factors; 2) Internet Gaming Disorder Scale-Short Form (IGDS9-SF); and 3) Depression Anxiety Stress Scale-21 (DASS-21).

IGD was measured using a self-administered Internet Gaming Disorder Scale Short Form (IGDS9-SF) questionnaire. IGDS9-SF is a reliable and valid tool.^{20,21,22,24} It is similar to the new IGD definition by the American Psychiatric Association Diagnostic and Statistical Manual of Mental Disorders Fifth Edition Text Revision, and it has a total of 9 items.⁷ To differentiate disordered gamers from non-disordered gamers, the participants should have at least five criteria out of the nine by considering answers as '5: Very Often', which translates as endorsement of the criterion. The tool was reviewed and evaluated in various studies that showed very good methodological quality and a positive rating for the quality of statistical findings concerning internal consistency (Cronbach α = .810-.963 and person separation reliability=.86) of this tool.²⁵ In this study, the internal consistency of IGDS9-SF was good (Cronbach's alpha= 0.802).

Depression, anxiety, and stress were determined using the Depression, Anxiety and Stress Scale-21 items. DASS-21 is a self-administered reliable and valid tool that was used to determine depression and anxiety among adolescents. The Cronbach's

alpha of DASS-21 is 0.74 which has good internal consistency.²⁶ The reliability (internal consistencies) of the DASS-21 Anxiety, Depression, Stress, and Total scales were estimated using Cronbach's alpha. The α was 0.88 (95% CI .87-.89) for the Depression scale, 0.82 (95% CI .80-.83) for the Anxiety scale, 0.90 (95% CI .89-.91) for the Stress scale, and 0.93 (95% CI .93-.94) for the total scale.²⁷ In this study, the internal consistency of the depression scale was good (Cronbach's alpha=0.803), the anxiety scale was acceptable (Cronbach's alpha=0.790), the stress scale was acceptable (Cronbach's alpha=0.742) and the total scale was excellent (Cronbach's alpha=0.909). Scores on the DASS-21 were multiplied by 2 to calculate the final score. The cut-off scores for depression was 10 and above, anxiety was 8 and above and stress was 15 and above.

Data Analysis

Out of the 760 questionnaires distributed to the preselected Grade 8 to 12 students of the participating schools, 681 were returned, resulting in a response rate of 88.44%. Among the returned questionnaires, 17.77% were excluded, comprising students aged 13 and over 18 years (17, 2.50%), non-players (55, 8.08%), recent online gamers (less than 1 year) (7, 1.03%), and those with incomplete responses exceeding 20% of the questionnaires (42, 6.17%). Chi square or Fisher's exact, when applicable, was used to determine the differences between those with and without IGD in terms of personal and gaming factors. Independent t-test was used to determine the mean age difference between IGD and no IGD. Logistic regression analysis was used to determine the association between IGD and depression, anxiety and stress, controlling for the effect of potential confounders. An odds ratio with a 95% confidence interval was also used to measure the association. A p-value of <0.05 is statistically significant.

Results

Personal Factors and IGD

There were 560 adolescent gamers from Grade 8 to 12 students included in the study. The mean age of the gamers was 15.98 years (± 1.45 years). There were 38.9% males, 49.8% females and 8.4%

LGBTQ. There were only 6 (1.1%) with IGD among adolescent gamers. There were 56.3% of adolescent gamers who belonged to a low monthly household income. There were 64.5% who spent PHP 0- 100 on internet gaming. Among those with IGD, 50% spent PHP 0-100, 33.3% spent PHP 101-500 and 16.7% spent PHP 501 and above on internet gaming. The mean age, grade level, type of school, monthly income, average weekly allowance and cost of internet gaming to IGD is not statistically different with p-value > 0.05 (Table 1).

Gaming factors and IGD

Most adolescent gamers have access to cellphones (88.4%). The most common types of internet games played were Multiplayer online battle arena (MOBA) (49.3%) and First-person shooter (FPS) (38.8%) games. There were 57.9% of adolescent gamers who played internet games <2 times a day and 39.3% played ≥ 2 times per day. However, among those without IGD, playing less than 2 times a day predominated and the difference is significant.

Most adolescent gamers played 2 hours and below per day (67.5%) during weekdays while 62.3% played more than 2 hours during weekends. Among those with IGD, 50% played more than 2 hours per day during weekdays and 100% played more than 2 hours during weekends. While among those without IGD, playing ≤ 2 hours during weekdays and playing more than 2 hours during weekends predominated.

Most adolescent gamers played at home (94.5%) and 13.2% played in other venues (computer shop, school, park, car, etc.). There were several students who played in more than 1 venue. Among those with IGD, there was a greater proportion who played in other venues, while among those without IGD, playing at home predominated and the difference was significant (Table 2).

Association of IGD with Depression

Table 3 shows the multiple logistic regression of the association of IGD with depression. The following variables were included in the analysis: age, gender, monthly household income, average weekly allowance, cost of gaming, accessibility to computer/gadget, type of internet games, frequency of internet gaming, duration of gaming during weekdays and

Table 1. Distribution of age, grade level, gender, and school type of adolescent gamers with IGD and without IGD.

Factors	With IGD n=6 No. (%)	Without IGD n=554 No. (%)	p-value
Age (years)	17.25 (±.96)	15.97 (±1.45)	.078
Grade level			.250
8	0 (0%)	89 (16.1%)	
9	0 (0%)	103 (18.6%)	
10	1 (16.7%)	99 (17.9%)	
11	4 (66.7%)	136 (24.5%)	
12	1 (16.7%)	127 (22.9%)	
Gender			.783
Male	3 (60.0%)	215 (39.9%)	
Female	2 (40.0%)	277 (51.4%)	
LGBTQ	0 (0%)	47 (8.7%)	
School type			.674
Regular	5 (83.3%)	387 (69.9%)	
Science	1 (16.7%)	167 (30.1%)	
Monthly household income			.388
Low income	3 (60.0%)	312 (69.2%)	
Middle income	1 (20.0%)	107 (23.7%)	
High income	1 (20.0%)	32 (7.1%)	
Average weekly allowance (PhP)			.675
0-100	1 (16.7%)	173 (32.8%)	
101-500	3 (50.0%)	235 (44.6%)	
501 and above	2 (33.3%)	119 (22.6%)	
Cost of internet gaming (PhP)			.353
0-100	3 (50%)	358 (68.5%)	
101-500	2 (33.3%)	91 (17.4%)	
501 and above	1 (16.7%)	74 (14.1%)	

weekends/ holidays, and venue for playing. There were 336 adolescent gamers with complete data that were included in the analysis. After controlling the effect of confounders, IGD is not statistically associated with depression, while gender is a significant predictor of depression. The odds of depression were 2.5 times more likely among females as compared to males, with a 95% confidence interval of 1.432 to 4.484 and p-value <0.05. The odds of depression were 3% lower among those with IGD as compared those without IGD. However, it is not statistically significant (OR .971, 95% CI .085 - 11.084, p-value > 0.05). The result

shows that there is no significant association between IGD and depression among adolescent gamers.

Association of IGD with Anxiety

Table 4 shows the multiple logistic regression of the association of IGD with anxiety. There were 336 adolescent gamers included in the analysis. After controlling the effect of confounders, IGD is not statistically associated with anxiety (p-value > 0.050). The result shows that there is no significant association between IGD and anxiety among adolescent gamers.

Table 2. Distribution of access to gadget, type of internet games, frequency of playing internet games and duration of internet games during weekdays and weekends/holidays and venue for playing among adolescent gamers with IGD and without IGD.

Gaming factors	With IGD n=6 No. (%)	Without IGD n=554 No. (%)	p-value
Access to gadget			
Cellphone	5 (83.3%)	490 (88.4%)	.525
Other gadgets	2 (33.3%)	232 (41.9%)	1.00
Type of Internet Games			
First-person shooter game (FPS)	4 (66.7%)	213 (38.4%)	.213
Real-time strategy game (RTS)	1 (16.7%)	112 (20.2%)	1.00
Massively multiplayer online game (MMO)	1 (16.7%)	161 (29.1%)	.678
Multiplayer online battle arena game (MOBA)	4 (66.7%)	272 (49.1%)	.444
Battle Royale games (BRG)	1 (16.7%)	168 (30.4%)	.673
Multi-User Dungeon (MUD)	0 (0%)	15 (2.7%)	1.00
Others	2 (33.3%)	139 (25.1%)	.645
Frequency of playing internet/online games per day			
≥2 times a day	6 (100.0%)	214 (39.8%)	.004*
<2 times /day	0 (0%)	324 (60.2%)	
Duration of playing internet games per day			
Weekdays			.376
> 2 hours	3 (50.0%)	163 (30.3%)	
≤ 2 hours	3 (50.0%)	375 (69.7%)	
Weekends/Holidays			.090
> 2 hours	6 (100%)	343 (62.8%)	
≤ 2 hours	0 (0%)	203 (37.2%)	
Venue of playing			
Home	4 (66.7%)	525 (94.8%)	.039*
Other venue	2 (33.3%)	72 (13.0%)	.182

Note. * Fisher's exact test p-value <0.05 is significant

Association of IGD with Stress

Table 5 shows the multiple logistic regression of the association of IGD with stress. Upon adjusting for confounding variables, there is no significant association between Internet Gaming Disorder (IGD) and stress. However, gender and engagement in playing First-Person Shooter (FPS) games emerge as significant predictors of stress. The odds of stress were 4 times more likely among LGBTQ adolescent gamers as compared to males, with a 95% confidence interval of 1.452 to 10.454 and p-value <0.05. The odds of stress were also 2 times among those who play FPS (OR 1.746, 95% CI 1.007-3.025) as compared to those

who did not play FPS. Moreover, the odds of stress were 6 times more likely among those with IGD as compared to without IGD. However, it is not statistically significant (OR 6.135, 95% CI .373-100.991 and p-value > 0.05). The result shows that there is no significant association between IGD and stress among adolescent gamers.

Association of IGD with both Depression and Anxiety

Table 8 shows the multiple logistic regression of the association of IGD with both depression and anxiety. After controlling the effect of confounders, IGD was not associated with both depression and anxiety, but age and gender were significant predictors of both depression

Table 3. Multiple logistic regression of the association of IGD with depression.

Factors	Adjusted OR	95% C.I. for aOR		p-value
		Lower	Upper	
Age	1.133	.951	1.348	.162
Gender				
Male	Ref			
Female	2.534	1.432	4.484	.001*
LGBTQ	2.789	.936	8.316	.066
Monthly household income				
Low income	Ref			
Middle income	.913	.490	1.699	.773
High income	1.581	.528	4.735	.413
Average weekly allowance				
PHP 0-100	Ref			
PHP 101-500	.806	.449	1.448	.471
≥PHP501	.959	.446	2.059	.914
Cost of internet gaming				
PHP 0-100	Ref			
PHP 101-500	1.653	.817	3.345	.163
≥PHP501	1.476	.671	3.247	.334
Access to gadget				
Cellphone	.768	.312	1.895	.567
Other gadgets	.742	.346	1.589	.442
Type of Games				
FPS	1.056	.587	1.897	.856
RTS	1.194	.847	1.681	.311
MMO	.847	.467	1.538	.586
MOBA	1.017	.884	1.169	.817
BRG	.999	.886	1.127	.991
MUD	.851	.657	1.102	.222
Others type of game	1.038	.944	1.142	.441
≥2 times per day of gaming	.603	.352	1.035	.066
>2 hours gaming on weekdays	1.708	.918	3.177	.091
>2 hours gaming on weekends	1.058	.580	1.931	.854
Type of venue for internet gaming				
Home	.431	.061	3.029	.398
Other venues	.687	.292	1.615	.389
With IGD	.971	.085	11.084	.981

Note. *p-value <0.05 is significant

and anxiety. For every year increase in age, the odds of both depression and anxiety increased by 19.4%. The odds of both depression and anxiety were 3 times more likely among females as compared to males (95% confidence interval of 1.696 to 5.297, p-value <0.05). Moreover, the odds of both depression and anxiety were 1.027 times higher among those with IGD as compared to without IGD (95% CI .089-11.846 and p-value > 0.05). The result show that there is no significant association between IGD and both depression and anxiety among adolescent gamers.

Discussion

The findings of this study indicated that Internet Gaming Disorder had a very low prevalence among adolescent gamers. The IGD prevalence was low as

compared to nearby Asian countries, with a range from 13.8% to 15.5%.^{15,28} Moreover, this prevalence was very low as compared to the reports of local studies, with a range from 10.4% to 54.76%.^{16,17,18,19}

Many factors could have contributed to the difference in results. The low prevalence of IGD could be attributed to the new definition of IGD based on DSM-5-TR by the American Psychiatric Association with 5 criteria endorsed as most often out of 9 criteria. Moreover, present study demographic was limited to adolescent gamers from two public high schools in Pasay City. Variations could also be explained by differences in gaming culture and access to gaming devices and the internet. Furthermore, the differences in the methods employed to evaluate IGD could also have influenced the findings.

Table 4. Multiple logistic regression of the association of IGD with anxiety.

Factors	Adjusted OR	95% C.I. for aOR		p-value
		Lower	Upper	
Age	1.165	.871	1.559	.304
Gender				
Male	Ref			
Female	2.424	.983	5.980	.055
LGBTQ	4.549	.506	40.909	.176
Monthly household income				
Low income	Ref			
Middle income	.795	.278	2.275	.668
High income	.385	.083	1.791	.224
Average weekly allowance				
PHP 0-100	Ref			
PHP 101-500	1.179	.492	2.825	.712
≥PHP501	3.834	.849	17.307	.081
Cost of internet gaming				
PHP 0-100	Ref			
PHP 101-500	1.320	.390	4.465	.655
≥PHP501	1.589	.392	6.449	.517
Access to gadget				
Cellphone	.470	.086	2.567	.384
Other gadgets	.552	.167	1.825	.330
Type of Games				
FPS	1.579	.580	4.297	.372
RTS	.670	.407	1.104	.116
MMO	.859	.319	2.312	.764
MOBA	1.020	.812	1.282	.865
BRG	1.118	.906	1.381	.298
MUD	.895	.598	1.338	.588
Others type of game	1.034	.890	1.202	.661
≥2 times per day of gaming	1.056	.434	2.567	.905
>2 hours gaming on weekdays	1.513	.521	4.397	.447
>2 hours gaming on weekends	1.257	.483	3.271	.639
Type of venue for internet gaming				
Home	.000	0.000		.999
Other venues	.963	.230	4.041	.959
With IGD	59977186.980	0.000		.999

The study identified that playing internet games 2 or more times per day and playing online games at home was associated with IGD. Frequent playing of online games increased the risk of IGD. This result agrees with the study that showed frequency of internet gaming was a risk factor for IGD.¹⁶ While playing at home was protective for IGD because it decreased the risk for IGD. The adolescent gamers who played at home may have different accessibility to the gadget and internet connection. Moreover, most young people came from families with low incomes and this may have limited their access to internet gaming at home. However, this result contrasts with the previous studies that showed no significant association between the venue and IGD.^{16,18} This may be due to the inaccessibility of gadgets and the

internet, so that the adolescent could play anywhere and may increase their risk of IGD.

Association of IGD with Depression

Based on the result of the current study, the odds of depression among those with IGD were higher as compared to no IGD. However, it was not statistically significant (p-value > .05). This contrasts with the studies that showed a significant positive low correlation of online games to depression.^{14,17,29,30} This may be due to the differences between the tools, definitions used in determining IGD, and the population in previous studies. Nonetheless, the prevalence of depression among adolescent gamers in this study was moderate (67%), suggesting

Table 5. Multiple logistic regression of the association of IGD with s-tress.

Factors	Adjusted OR	95% C.I.for aOR		p-value
		Lower	Upper	
Age	.938	.797	1.104	.439
Gender				
Male	Ref			
Female	1.604	.935	2.752	.086
LGBTQ	3.897	1.452	10.454	.007*
Monthly household income				
Low income	Ref			
Middle income	1.053	.588	1.886	.862
High income	1.086	.413	2.854	.868
Average weekly allowance				
PHP 0-100	Ref			
PHP 101-500	1.115	.642	1.938	.699
≥PHP501	1.720	.842	3.511	.137
Cost of internet gaming				
PHP 0-100	Ref			
PHP 101-500	1.596	.839	3.035	.154
≥PHP501	1.446	.694	3.014	.325
Access to gadget				
Cellphone	.509	.225	1.151	.105
Other gadgets	.866	.423	1.771	.693
Type of Games				
FPS	1.746	1.007	3.025	.047*
RTS	.958	.697	1.318	.794
MMO	1.549	.888	2.703	.123
MOBA	1.032	.906	1.177	.635
BRG	.937	.836	1.051	.266
MUD	.859	.657	1.123	.266
Others type of game	.969	.887	1.058	.482
≥2 times per day of gaming	1.227	.736	2.046	.433
>2 hours gaming on weekdays	1.100	.624	1.938	.742
>2 hours gaming on weekends	.801	.451	1.423	.449
Type of venue for internet gaming				
Home	6.616	.793	55.193	.081
Other venues	1.306	.574	2.975	.525
With IGD	6.135	.373	100.991	.204

Note. *p-value <0.05 is significant

potential negative effects that warrant interventions and additional research to mitigate its harmful consequences.

Association of IGD to Anxiety

This study shows that adolescent gamers with IGD were at risk of anxiety. Among those with IGD, all of them had anxiety, however, it was not conclusive (p-value > .05). This is in contrast with the results of the studies that showed a significant positive low correlation with anxiety with IGD.^{9,14,29,30,31}

Despite the lack of significant association between IGD and anxiety, anxiety was very high among adolescent gamers, which manifested into

health illness and symptoms such as body aches and headaches. This shows the importance of early and timely assessment of risk factors and implementation of effective ways of reducing the incidence and impact of IGD and anxiety among adolescents.

Association of IGD to Stress

This study found that the odds of stress among those who had IGD were higher as compared to those with no IGD, however, it was not statistically significant. This is not aligned with the previous study that showed the association between IGD and stress.³² However, this study demonstrated a higher prevalence of stress (46%) among adolescent gamers

Table 6. Multiple logistic regression of the association of IGD with depression and anxiety.

Factors	Adjusted OR	95% C.I.for aOR		p-value
		Lower	Upper	
Age	1.194	1.003	1.420	.046*
Gender				
Male	Ref			
Female	2.997	1.696	5.297	.001*
LGBTQ	2.815	.989	8.013	.053
Monthly household income				
Low income	Ref			
Middle income	.945	.507	1.761	.859
High income	1.319	.460	3.783	.607
Average weekly allowance				
PHP 0-100	Ref			
PHP 101-500	.856	.480	1.528	.599
≥PHP501	.967	.454	2.063	.932
Cost of internet gaming				
PHP 0-100	Ref			
PHP 101-500	1.924	.944	3.921	.071
≥PHP501	1.699	.771	3.742	.189
Access to gadget				
Cellphone	.693	.282	1.707	.426
Other gadgets	.777	.362	1.665	.516
Type of Games				
FPS	1.103	.616	1.977	.741
RTS	1.131	.806	1.588	.476
MMO	.911	.503	1.648	.757
MOBA	1.029	.895	1.182	.689
BRG	1.010	.896	1.139	.868
MUD	.857	.661	1.110	.241
Others type of game	1.045	.951	1.148	.360
≥2 times per day of gaming	.656	.383	1.123	.124
>2 hours gaming on weekdays	1.635	.886	3.019	.116
>2 hours gaming on weekends	1.050	.577	1.908	.874
Type of venue for internet gaming				
Home	.401	.056	2.861	.362
Other venues	.795	.338	1.874	.600
With IGD	1.027	.089	11.846	.983

Note. *p-value <0.05 is significant

as compared to previous studies with a range from 25-36.5%.^{30,33,34} Further investigation is required to explore the risk factors associated with Internet Gaming Disorder (IGD) and stress among adolescents, as these factors can significantly impact their physical health and overall well-being.

Association of IGD to both Depression and Anxiety

Adolescents with IGD had higher odds of both depression and anxiety as compared to those with no IGD, though, not statistically significant. This is in contrast to previous studies that showed a significant association of anxiety, depression and IGD.^{29,31} Despite the lack of significant association of IGD to both depression and anxiety, adolescent gamers were

at high risk for multiple mental health burdens and thus needed interventions and further research to prevent its negative effects.

Limitations

One limitation of the study was the utilization of a cross-sectional study design, which did not provide sufficient evidence to establish causality and directionality in the associations between factors influencing Internet Gaming Disorder (IGD) and its impact on depression, anxiety, both depression and anxiety, and stress in adolescents. The use of a self-administered questionnaire may have resulted in reporting bias and underreporting of the prevalence of mental health disorders among teenagers.

However, despite the shortcomings of the study design, the DASS-21 and IGDDS9-SF questionnaires were acceptable, appropriate and reliable screening instruments for depression, anxiety, stress, and IGD.

Implications

Overall, this study added to the knowledge of the local prevalence of IGD using the new definition based on DSM-5-Text Revision of the American Psychiatric Association. In addition, this is the first local study among adolescent gamers from selected public high schools in Pasay City. Moreover, this study added to the knowledge of the association of IGD and depression, anxiety, and stress among adolescents. Furthermore, the data provided by the study would help the school administrators to be able to appropriately plan a course of action to prevent the negative effects of problematic internet gaming.

Conclusion

In conclusion, this study showed that adolescents in 2 high schools had a very low prevalence of Internet Gaming Disorder, moderate prevalence of depression, stress and both depression and anxiety, and a high prevalence of anxiety. Adolescent gamers who played 2 or more times per day were also at risk of IGD while those who played at home were also less likely to have IGD. Finally, the odds of depression, anxiety, stress and both depression and anxiety were higher among those with IGD as compared to those with no IGD. However, the association of IGD with depression, anxiety, stress, and both depression and anxiety were not statistically significant. Hence, the null hypothesis is not rejected.

In light of the conclusion, the researcher proposes the following recommendations for future studies:

1. Conduct further research with a larger sample size, enhanced geographical representation, and longitudinal studies to explore additional associated risk factors of Internet Gaming Disorder (IGD), depression, anxiety, and stress, aiming to establish causal relationships among these factors.
2. Improve the response rate by designing a personalized survey template that is both easily

understandable and user-friendly. Additionally, seek assistance from school heads to encourage participation and consider providing incentives or tokens to respondents.

3. Reevaluate the criteria defining IGD in the local cultural and social context. Validate the content of the assessment tool by consulting local psychiatrists, psychologists, and pediatricians.

For school administrators, increasing awareness and early screening of the presence of IGD, depression, anxiety, stress, and both depression and anxiety among adolescents in public and private high schools are needed to prevent the negative effects.

For policy makers, creating programs and interventions for different ages and genders in schools and homes will provide targeted interventions to decrease the frequency of internet gaming and manage depression, anxiety, stress and IGD among adolescents.

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