Prevalence and Predictors of Internet Gaming Disorder among Adolescents

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Abstract

Internet Gaming Disorder (IGD) refers to recurring and persistent use of internet to engage in online or offline video games often with other players leading to significant impairment or distress. **The aim** of the present study was to assess prevalence and predictors of internet gaming disorder among adolescents. **Design:** A cross-sectional descriptive design was utilized. **Methods:** A sample of 555 adolescents randomly selected by using a multi-stage cluster sampling from preparatory and secondary schools in Zagazig, Minia El Kamh, and Abo Hammad cities, Sharkia Governorate, Egypt. Data were collected by using two tools, first tool a questionnaire sheet to assess; socio-demographic data and gaming behaviors, second tool; Internet Gaming Disorder Scale Short-Form (IGDS-SF). **Results** revealed that the prevalence of internet gaming disorder among the studied adolescents was 7.9%. Also, the results demonstrated that overcrowding, bad relation with fathers, parents limit on gaming time and suffering from chronic disease are statistically significant positive predictors of IGD among adolescents. **Conclusion:** The prevalence of IGD in this sample was relatively moderate as compared to previous studies and identifies the predictors of those with IGD. **Recommendations:** Designing and implementing tailored innovative interventions for adolescents with internet gaming disorder.

Keywords: Adolescents, Prevalence, Predictors, Internet Gaming Disorder, and Gaming behaviors.

Introduction

Upsurge in the use of internet and smart phones, was accompanied by rapid assessment of technology worldwide **(Orbatu et al., 2019)**. This increased availability of internet and internet-related activities has given rise to concerns about their effect on wellbeing. Adolescents and young adults are the foremost active users of the internet and modern technologies as they have grown up in an environment with a well-developed internet **(American Psychaitric Association, 2013)**. Roughly two-thirds of internet users worldwide are among the 15-24 age group **(Kardefelt-Winther et al., 2019).** Thus adolescents, aged from 12 to 17 years, seem particularly vulnerable since they access the internet more than other age groups **(Anderson et al., 2017).** According to World Health Organization (WHO), adolescents (aged 10-19 years) represent 1.2 billion out of 7.2 billion people worldwide **(WHO, 2018).**

Internet gaming disorder (IGD) was classified as addictive behavioral disorder and included under the heading of non-substance related disorders for the first time in the Diagnostic and Statistical Manual of Mental Disorders -5 (DSM-5) **(Orbatu et al., 2019).** IGD refers to the problematic use in both online and offline settings. It is defined as persistent and recurrent use of the internet to engage in games, often with other players, leading to clinically significant impairment or distress as indicated by five (or more) of the nine criteria in a 12-month period **(Mihara & Higuchi, 2017)**. IGD is 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 **(Undavalli et al., 2020).**

Internet gaming disorder causes physical, social, and mental or psychological problems which affect individual, family and the whole community. Evidence support the association between IGD and physical problems like sleep disturbance, eating problems, limited physical activity, back strain, eyestrain, and impaired vision **(Weinstein et al., 2017 & Kuss et al.,**

2018). As an addictive disorder, internet gaming can have detrimental effects on vulnerable individuals including unhealthy habits, disturbed sleep and increased anxiety **(Männikkö et al., 2020).**

In a meta-analysis that included 16 studies, the pooled prevalence of IGD among adolescents was 4.6% **(Fam, 2018).** Some countries, including China and South Korea, have developed treatment plans for IGD **(American Psychiatric Association, 2018)** but in Egypt treatment guidelines have not been established due to insufficient evidence. Therefore, there is an urgent need to improve existing treatment programs which are currently impeded by the lack of research in this area **(El Sherbini & Abdou, 2020).**

School nurses, pediatric nurses, nurse practitioners and other primary health care providers are basically the first responders for mental health problems and issues related to media use in children and adolescents **(Gentile et al., 2017)**. The nurse's role involves assessment and screening, collaborative planning for appropriate educational plans, referral to mental health providers, and education. Poor academic performance may be a sign of gaming addiction so the school nurse should be poised to early identify the problem and appropriately intervene. Moreover, nurses play an integral role in the interdisciplinary team that manages gaming disorders in adolescents. Besides early identification of the disorder advocacy for appropriate mental health care to maintain academic success and wellbeing in affected adolescents is another important nurse's role **(Johnson & Edwards, 2020).**

Operational definition

In the current study adolescents who fulfill five or more from the nine proposed criteria of internet gaming disorder (IGD) according to the Diagnostic and Statistical Manual of Mental Disorders -5 (DSM-5) were considered disordered. Disordered gaming was measured by using the Internet Gaming Disorder Scale short-form (IGDS9-SF). The nine criteria of IGD include; preoccupation with games, withdrawal symptoms when gaming is taken away, tolerance (the need to spend increasing amounts of time engaged in

games), unsuccessful attempts to control or reduce the participation in games, loss of interest in real life relationships, previous hobbies and entertainment, continued excessive use of games despite knowledge of psychosocial problems, deceiving family members, therapists, or others regarding the amount of gaming, use of games to escape or relieve a negative mood and jeopardizing or lost a significant relationship, job, or educational or career opportunity because of participation in games.

Aim of the study

The aim of the current study was to assess the prevalence and predictors of internet gaming disorder among adolescents at Sharqia Governorate, Egypt.

Research questions

1. What is the prevalence of IGD among adolescents?

2. What are the predictors of IGD among adolescents?

Subjects and Methods

Design: A descriptive cross-sectional design was utilized in this study.

Setting: The study was conducted at 9 preparatory and secondary schools randomly selected from Zagazig, Minia Ekamh, and Abo Hammad cities, Sharkia Governorate, Egypt.

Subjects: A sample of 555 adolescents (12-18 years) was randomly selected for recruitment of the current study.

Sampling technique: A random multistage cluster sampling technique was used in the recruitment of this study subjects as follows:

Stage 1: From the 18 educational administrations of Sharkia Governorate, the researchers randomly selected four administrations; West and East administrations in Zagazig city, Minia Elkamh, and Abu Hammad educational administrations.

Stage 2: From the four selected educational administrations, four preparatory and four high schools were selected randomly.

Stage 3: This stage involved selection of the classes as clusters from schools according

to the required sample size. This was done through random sampling of the classes. All students in the selected classes were included in the sample.

Sample calculation

A sample of 555 adolescents is required to estimate the average IGD of 4.6% with precision of 2% at 95% confidence level and design effect of 2. This sample was divided into 244 students from preparatory schools and 311 students from secondary schools. This division was based on the ratio calculated from the numbers of students obtained from the General Department of Information and Computer (GDIC) affiliated to the Education Department at Sharkia Governorate.

Tool of data collection

Tool 1: A self-administered questionnaire sheet developed by the researchers and consisted of the following two parts:

Part I: Socio-demographic data: This part entails data about personal, family, socio-economic, social relationships, and work and leisure habits characteristics of the adolescents. Personal data such as adolescent's age, gender, school grade, residence, birth order, and siblings number. Family data include questions about parent's educational level and occupation. Socio-economic data include crowding index and family income. Work and leisure habits data as sport practicing, favorite hobbies, number of friends. Social relationships questions about the relationships with parents, peers, and siblings.

Part II: Internet Gaming-related Behaviors: This part developed by the researchers guided by **Conrad (2018)** and included questions to assess gaming-related behaviors of the adolescents such as type of online games, frequency of gaming per school day and per weekend day (in hours), parent limit on playing time.

Tool 2: Internet Gaming Disorder Scale short-form (IGDS9-SF) (Pontes & Griffiths, 2015)

The IGDS9-SF is one of the most widely psychometric assessment tools measuring the disordered gaming. It is used to assess the severity of IGD and its harmful effects by evaluating online and offline gaming activities during the previous 12 months. It entails a set of nine items reflecting the nine diagnostic criteria to assess IGD listed in the DSM-5 **(APA, 2013)**. The psychometric properties of this scale have been extensively investigated in cross-cultural research conducted across many countries and languages. In the present study, the IGDS9-SF presented with adequate internal consistency as estimated *by Cronbach's Alpha (r=0.77).*

Scoring: All nine items of the scale can be responded using a Likert scale ranging from 1 "never" to 5 "very often, with greater scores indicating higher severity of disordered gaming. Those who answered with "very often" to at least five items of the IGDS9-SF were classified as "disordered gamers" and were compared to "non-disordered gamers".

Pilot study

A pilot study was carried out on a sample of 66 adolescents from one preparatory and one secondary school. The aim was to test clarity of the instructions, the format of the questionnaire, comprehension of the items, and to estimate the exact time required for filling the questionnaire sheet. The necessary modifications were done based on the analysis of the pilot study to develop the final format. The participants involved in the pilot study were not included in the main study sample.

Administrative and ethical consideration

Ethical clearance was obtained from the ethical committee at the Faculty of Nursing, Zagazig University. Official permissions were obtained from the Education Directorate at Zagazig based on letters from the Faculty of Nursing explaining the aim and procedures of the study. The Director General referred the researchers to the directors of the selected schools with approval letters. Then the researcher met with each of them and explained the aim of the study and the nature of tool used for data collection. It also clarified the rights to refuse or withdraw, as well as the confidentiality and anonymity of the collected information. Also participants were assured that any obtained information will be used for

the research purpose only. Informed consents were obtained from the parents through the directors of the selected schools.

Field work

This study was completed within 5 months between October 2019 and February 2020. Once permission was granted to proceed with the study, the researchers met with the directors of the selected schools, explained to them the study aim as well as the data collection tool. They were asked to seek the permission of the parents of the students in the selected classes to participate in the study. Once parents' consents were secured, the researchers went to schools, introduced themselves to students in classrooms, and explained to them the purpose and nature of the study and the data collection forms. They were asked to fill in the questionnaire sheets under guidance of the researcher who stayed in the classroom to answer any specific questions that arose while participants completed the questionnaire. It took the student about 20 to 30 minutes to complete answering the questions.

Limitations of the study

The researcher was forced to depend mainly on governmental schools due to refusal of private schools' administration to conduct this study in their premises. Additionally, the scarcity of studies in the national literature made the researcher depend mainly on international studies for discussion of the results.

Statistical analysis

All data were collected, tabulated and statistically analyzed using SPSS 23.0 for windows (SPSS Inc., Chicago, IL, USA2011). Quantitative data were expressed as the mean $\pm$ SD & (range), and qualitative data were expressed as absolute frequencies (number) & relative frequencies (percentage). Percent of categorical variables were compared using Chi-square test. All tests were two sided. P-value < 0.05 was considered statistically significant (S), and p-value $\geq$ 0.05 was considered statistically insignificant (NS). The logistic regression is a predictive analysis. Logistic regression is used to describe data and

to explain the relationship between one dependent binary variable and one or more nominal, ordinal, interval or ratio-level independent variables.

Results

Table 1 shows that mean age of the studied adolescents was 15.3±1.9 years. Males represented 52.4% of the studied sample. Moreover 56.5% were secondary school students and 53.3% of the studied adolescents were from rural areas. As regards to father and mother education, 45.5% and 42.7% of the studied adolescents' fathers and mothers ended their collage or postgraduate education respectively.

As observed from **table 2,** 16.4% of the studied adolescents always stay up late to play games and wake up tired in the next morning. In addition 51.7% of the studied adolescents admitted that they are gaming too much.**Table 3** reveals that the prevalence of internet gaming disorder (IGD) among studied adolescents was 7.9%.

As observed from table 4, statistically significant relations were found between IGD and crowding index (p=0.01), suffering from chronic disease (p=0.001), relationship with father (p=0.007), and study load of the studied adolescents (p=0.04). **Table 5** reveals statistically significant relation between IGD and playing puzzle games (p=0.05) and the limits parents set on the time spent on gaming (p=0.3).

As observed from table 6 there were statistically significant relations between IGD and all gaming behaviors of the studied adolescents except neglecting their hygiene because of excessive gaming. **Table 7** shows that the significant predictors of IGD were overcrowding, bad relation with father, parents' limits on the time spent on gaming and suffering from chronic disease, effect of predictor factors was 11.5% on occurrence of internet gaming disorder.

Table (1): Socio-demographic characteristics of studied Adolescents and their parents (n.555):

Items	n.(555)	Percent (%)
Age per years		
≤15	276	49.7
>15	279	50.3
mean± SD	15.3±1.9	
range	12-19	
Gender		
male	288	52.4
female	267	48.5
School		.
preparatory	244	44.4
secondary	311	56.5
Residence		.
urban	262	47.6
Rural	293	53.3
Fathers' education		.
illiterate or read and write	58	10.5
primary education	99	18.0
secondary education	148	26.9
collage or post graduate	250	45.5
Fathers' occupation		
Farmer or worker	54	9.7
Employee	242	43.6
Handicraft	64	11.5
Professional	154	27.7
Other	41	7.4
Mothers' education		
illiterate or read and write	71	12.9
primary education	75	13.6
secondary education	174	31.6
collage or post graduate	235	42.7
Mothers' working status		
work	355	64.5
housewife	200	36.4
Crowding index		
≤1	87	15.7
>1	468	84.3
Monthly income		
sufficient	266	48.4
insufficient	233	42.4
sufficient and save	56	10.2

Table (2): Gaming behaviors among the studied Adolescents (n.555):

Items	n.(555)	Percent (%)
Staying up late to play making you tired the next morning		
Never or rarely	150	27.1
Occasionally	222	40.0
Frequently	92	16.5
Almost always	91	16.4
Play games before completing your homework		
Never or rarely	194	34.9
Occasionally	245	44.14
Frequently	56	10.09
Almost always	60	10.8
Prefer to play games more than going out with friends		
Never or rarely	211	38.01
Occasionally	185	33.3
Frequently	85	15.3
Almost always	74	13.3

Items	n.(555)	Percent (%)
Playing games affected your academic achievement		
Not at all true	292	52.6
Somewhat true	176	31.7
Definitely true	87	15.7
Neglects your hygiene because of excessive gaming		
Never or rarely	443	79.8
Occasionally	80	14.4
Often	17	3.06
Always	15	2.7
Inaccessibility to games causing irritability or anxiety		
Never	136	24.5
Rarely	193	34.7
Often	129	23.2
Always	97	17.4
Asking about gaming habits making you angry		
Never	255	45.9
Yes, occasionally	172	30.9
Yes, often	57	10.3
Yes, almost always	71	12.7
Play games at the first available opportunity		
Never	117	21.1
Rarely	145	26.1
Sometimes	179	32.2
Often	114	20.5
Eat meals while playing games		
Never, just a snack now and then	245	44.1
Sometimes	178	32.1
Often	76	13.7
Always	56	10.1
Gaming sessions last 7 or more hours nonstop		
Never	291	52.4
Rarely	107	19.2
Sometimes	85	15.3
Often	71	12.7
It is difficulty to give up all games for one week		
No, not at all	230	41.4
I wouldn't like it, but i could do it	138	24.8
I would have great difficulty	89	16.03
It would be virtually impossible for me	98	17.6
Do you admit that you are gaming too much		
yes	287	51.7
no	268	48.3
Hours spend at gaming (week day)		
<4 hour	457	82.3
4-<8 hours	61	10.9
8-<12hours	32	5.7
≥12 hours	5	0.9
Hours spend at gaming (weekend day)		
<4 hour	308	55.4
4-<8 hours	94	16.9
8-<12hours	43	7.7
≥12 hours	110	19.8

Table 3: Prevalence of Internet Gaming Disorder among adolescents in the study sample (n.555)

Items	Never		Rarely		Sometimes		Often		Very Often	
	n.	%	n.	%	n.	%	n.	%	n.	%
1. Preoccupation with gaming	271	48.8	82	14.8	126	22.7	37	6.7	39	7.0
2. Withdrawal symptoms when gaming is taken away or not possible (sadness, anxiety, irritability)	246	44.3	108	19.5	119	21.5	33	5.9	49	8.8
3. Tolerance—the need to spend more time gaming to satisfy the urge	182	32.8	89	16.0	125	22.5	83	15.0	76	13.7
4. Inability to reduce playing, unsuccessful attempts to quit gaming	243	43.8	112	20.2	106	19.0	52	9.4	42	7.6
5. Giving up other activities, loss of interest in previously enjoyed activities due to gaming	300	54.1	84	15.1	77	13.9	43	7.7	51	9.2
6.Continuing to game despite problems	266	47.9	73	13.2	80	14.4	62	11.2	74	13.3
7. Deceiving family members or others about the amount of time spent on gaming	343	61.8	74	13.3	61	11.0	32	5.8	45	8.1
8. The use of gaming to relieve negative moods, such as guilt or hopelessness	188	33.9	72	13.0	121	21.8	67	12.0	107	19.3
9. Risk, having jeopardized or lost a job or relationship due to gaming	383	69.0	71	12.8	48	8.6	23	4.2	30	5.4
Internet gaming disorder										
yes				44(7.9)						
No				511(92.1)						
Mean ± SD				19.5±7.4						
range				9-41						

Table 4: Relation between IGD and Socio-demographic characteristics, study load and social relationships of the adolescents in the study sample (n=555).

Items	Internet Gaming				N.	χ²	P-value
	Disordered		Non-disordered				
	N.	%	N.	%			
Age per years							
≤15	16	5.8	260	94.2	276	3.4	0.06
>15	28	10.0	251	90.0	279		
Mean± SD			15.3±1.9				
Range			12-19				
Gender							
Male	28	9.7	260	90.3	288	2.6	0.1
Female	16	6.0	251	94.0	267		
Fathers' education		.		.			
Illiterate or read and write	2	3.4	56	96.6	58		
Primary education	8	8.1	91	91.9	99	4.3	0.21
Secondary education	17	11.5	131	88.5	148		
University or post graduate	17	6.8	233	93.2	250		
Fathers' occupation		.		.			
Farmer or worker	3	5.6	51	94.4	54		
Employee	21	8.7	221	91.3	242	2.7	0.61
Handicraft	6	9.4	58	90.6	64		
Professional	9	5.8	145	94.2	154		
Other	5	12.2	36	87.8	41		
Mothers' education		.		.			
Illiterate or read and write	3	4.2	68	95.8	71		
Primary education	9	12.0	66	88.0	75		
Secondary education	17	9.8	157	90.2	174	4.6	0.2
University or post graduate	15	6.4	220	93.6	235		
Mothers' working status		.		.			
Working	27	7.6	328	92.4	355	0.14	0.71
Housewife	17	8.5	183	91.5	200		
Crowding index		.		.			
≤1	1	1.1	86	98.9.	87	6.5	0.01 (S)
>1	43	9.2	425	.90.8	468		
Chronic disease							
No	35	6.8	479	93.2	514	11.9	0.001 (S)
yes	9	22.0	32	78.0	41		

Items	Internet Gaming				N.	χ^2	P-value
	Disordered		Non-disordered				
	N.	%	N.	%			
Sport practicing		.		.			
yes	26	8.6	277	.91.4	303	0.39	0.53
No	18	7.1	234	.92.9	252		
Parents relationship		.		.			
Good	36	8.3	400	91.7	436	0.99	0.61
Normal	6	5.9	96	94.1	102		
Bad	2	11.8	15	88.2	17		
Relationship with mother		.		.			
Good	36	7.6	436	92.4	472		
Normal	6	8.1	68	91.9	74	2.6	0.27
Bad	2	22.2	7	77.8	9		
Relationship with father		.		.			
Good	26	6.3	390	93.8	416		
Normal	13	11.1	104	88.9	117	9.8	0.007
Bad	5	22.7	17	77.3	22		(S)
Study load		.		.			
Low	8	9.8	74	90.2	82		
Normal	15	5.2	274	94.8	289	6.4	0.04
Too much	21	11.4	163	88.6	184		(S)

χ^2 =Chisquare test   (S) significant p <0.05

Table (5): Relation between IGD, Game Type and parental control over gaming activity of the adolescents (n=555):

Items	Internet Gaming				N.	χ^2	p-value
	Disordered		Non-disordered				
	n.	%	n.	%			
Game type							
Action adventure	26	10.2	230	89.8	256	3.2	0.072
Racing sport	4	4.1	93	95.9	97	2.33	0.127
Strategy fighting	0	.0	19	100.0	19	f	0.387
Role playing	1	2.9	34	97.1	35	0.97	0.347
Simulation	14	9.9	128	90.1	142	F	0.32
Educational	1	7.7	12	92.3	13	3.79	0.99
Puzzle game	11	13.3	72	86.7	83		0.05 (S)
Parents limit the time spent on gaming		.		.			
yes	32	10.2	283	89.8	315	4.9	0.03
no	12	5.0	228	95.0	240		(S)
Parents decide type of game		.		.			
Always	4	3.8	102	96.2	106		
Usually	7	8.3	77	91.7	84	3.7	0.29
Rarely	9	7.5	111	92.5	120		
Never	24	9.8	221	90.2	245		
Accessibility to games in your room		.		.			
yes	41	8.8	424	91.2	465	3.1	0.08
no	3	3.3	87	96.7	90		
Family is concerned about how much you played		.		.			
No. they know and are not worried	4	3.3	118	96.7	122		
No. they do not know	9	9.8	83	90.2	92	4.7	0.1
Yes, they are concerned	31	9.1	310	90.9	341		

χ^2 =Chisquare test   (S) significant p <0.05

Table (6): Relation between IGD and gaming behaviors of the adolescents in the study sample (n=555):

Items	Internet Gaming				N.	χ²	p-value
	Disordered		Non-disordered				
	N.	%	N.	%			
Staying up late to play making you tired the next morning							
Never or rarely	3	2.0	147	98.0	150		
Occasionally	8	3.6	214	96.4	222	44.4	0.0001
Frequently	12	13.0	80	87.0	92		(S)
Almost always	21	23.1	70	76.9	91		
Play games before completing your homework							
Never or rarely	7	3.6	187	96.4	194		
Occasionally	15	6.1	230	93.9	245	26.3	0.0001
Frequently	12	21.4	44	78.6	56		(S)
Almost always	10	16.7	50	83.3	60		
Prefer to play games more than going out with friends							
Never or rarely	14	6.6	197	93.4	211		
Occasionally	10	5.4	175	94.6	185	9.3	0.025
Frequently	8	9.4	77	90.6	85		(S)
Almost always	12	16.2	62	83.8	74		
Playing games affected your academic achievement							
Not at all true	14	4.8	278	95.2	292		
Somewhat true	17	9.7	159	90.3	176	10.5	0.005
Definitely true	13	14.9	74	85.1	87		(S)
Neglects your hygiene because of excessive gaming							
Never or rarely	31	7.0	412	93.0	443		
Occasionally	8	10.0	72	90.0	80	6.7	0.09
Often	4	23.5	13	76.5	17		
Always	1	6.7	14	93.3	15		
Inaccessibility to games causing irritability or anxiety							
Never	4	2.9	132	97.1	136		
Rarely	6	3.1	187	96.9	193	26.9	0.0001
Often	18	14.0	111	86.0	129		(S)
Always	16	16.5	81	83.5	97		
Asking about gaming habits making you angry							
Never	9	3.5	246	96.5	255		
Yes, occasionally	11	6.4	161	93.6	172	33.7	0.0001
Yes, often	7	12.3	50	87.7	57		(S)
Yes, almost always	17	23.9	54	76.1	71		
Play games at the first available opportunity							
Never	5	4.3	112	95.7	117		
Rarely	7	4.8	138	95.2	145	29.5	0.0001
Sometimes	9	5.0	170	95.0	179		(S)
Often	23	20.2	91	79.8	114		
Eat meals while playing games							
Never, just a snack now and then	18	7.3	227	92.7	245		
Sometimes	7	3.9	171	96.1	178	11.9	0.008
Often	10	13.2	66	86.8	76		(S)
Always	9	16.1	47	83.9	56		
Gaming sessions last 7 or more hours nonstop							
Never	11	3.8	280	96.2	291		
Rarely	8	7.5	99	92.5	107	23.3	0.0001
Sometimes	11	12.9	74	87.1	85		(S)
Often	14	19.7	58	80.5	71		
It is difficulty to give up all games for one week							
No, not at all	7	3.0	223	97.0	230		
I wouldn't like it, but i could do it	10	7.2	128	92.8	138	18.7	0.0001
I would have great difficulty	12	13.5	77	86.5	89		(S)
It would be virtually impossible for me	15	15.3	83	84.7	98		
Do you admit that you are gaming too much							
yes	40	13.9	247	86.1	287	29	0.0001
no	4	1.5	264	98.5	268		(S)
Hours spend at gaming (week day)							
<4 hour	19	43.2	438	85.7	457		
4-<8 hours	16	36.4	45	8.8	61	75.069	0.001
8-<12hours	5	11.4	27	5.3	32		(S)
≥12 hours	4	9.1	1	0.2	5		
Hours spend at gaming (weekend day)							
<4 hour	10	22.7	298	58.3	308		
4-<8 hours	9	20.5	85	16.6	94	31.425	0.001
8-<12hours	11	25.0	32	6.3	43		(S)
≥12 hours	14	31.8	96	18.8	110		

χ² =Chisquare test   *(S) significant p <0.05*

Table (7): Logistic regression for predictors variables of IGD of the adolescents

Variables	P-value	Lower limit of 95%CI	odds ratio	upper limit of 95%CI
Crowding [>1]	**0.041**	**1.1**	**8.1**	**60.2**
***Relationship with fathers [Bad]**	**0.04**	**1.06**	**3.3**	**10.6**
Parents' limits on the time spent on gaming [Yes]	**0.042**	**1.03**	**2.1**	**4.2**
Chronic disease [Yes]	**0.016**	**1.22**	**2.9**	**7**

CI= confidence interval   **Relationship with father good (reference)*

Discussion

The current study was conducted on a random sample of 555 preparatory and secondary school adolescents with mean age 15.3±1.9 years. The estimated prevalence of internet gaming disorder (IGD) among the studied adolescents was 7.9%. This prevalence is slightly lower the previous national study of **ELNahas et al. (2018)** who reported that the prevalence was 9.3% of IGD among 996 University students. Additionally, **Al Gammal et al. (2019)** reported that 13.6% out of 60 university students were disordered.

On the other hand, lower prevalence rates among adolescents were reported by **Rehbein et al. (2015)** in Germany (1.2%), **Lemmens et al. (2015)** in Netherlands (5.5%), **Undavalli et al. (2020)** in India (3.50%) and **Taechoyotin et al. (2020)** in Thailand (5.4%). Furtheremore, **Fam (2018)** reported a pooled prevalence of IGD among adolescents from a meta-analysis 4.6%.

The noticed difference between prevalence of IGD in this study and other studies either by increase or decrease may be related to different sample characteristics despite the fact that all mentioned studies are conducted on adolescents. Also, it may be related to cross-cultural differences between countries. Sociocultural factors such as national life satisfaction, cultural masculinity, and power distance were found to be moderators for IGD symptoms at the country level **(Cheng et al., 2018)**.

A statistically significant relations were found between IGD and all gaming behaviors of the studied adolescents including number of hours spent in gaming either per weekday or weekend day (P<0.001). But whether these gaming behaviors contribute to IGD or IGD

lead to these behaviors "the direction of causality" is not clear and this may be attributed to the cross-sectional design of the current study. Similarly with this study findings, **Rho et al. (2018)** also found significant association between IGD and weekday game time. Likewise, **Gentile (2009)** and **King et al. (2013)** in a longitudinal study of gaming suggested that more time spent gaming carry increased risk for being a disordered gamer.

Bad relationship with the father, overcrowding and suffering from chronic illness were significant predictors for IGD in the current study. The studied adolescents may use gaming as escaping technique from unpleasant real-life problems such as frustrating relationships (bad relation with father), unsuitable house conditioning (overcrowding) as well as negative feeling associated with chronic illness. On consistency with these findings, **Beranuy et al. (2013)** and **Bonnaire and Phan (2017)** found that poor family relationships especially with parents are associated with IGD.

Gaming provides the gamers with feelings of power and autonomy. Moreover, pathological gamers usually overestimate gaming rewards, activities, identities or items. This stimulates preoccupation with gaming, loss of interest in less attractive real-life activities and facilitate escape from real-life problems **(King & Delfabbro 2014)**. Moreover, **Beranuy et al. (2013)** reported that escapism, entertainment, and/or virtual friendship are the three important factors of initial gaming motivation.

Limits parents set on time spent gaming was a significant predictor of IGD in the present study. This is in line with **Bonnaire and Phan (2017)** who reported that rules about

gaming use are important in males while proscription is associated with IGD in females. On the contrary, **Smith et al. (2015)** found that limit setting showed no significant effect on gaming in adolescents. The association between IGD and setting limits by parents that was found in the current study could be explained by the "forbidden fruit hypothesis" of **Paulus et al. (2018)** where adolescents usually prefer to experience what parent forbid. Besides that, **Bijvank et al. (2009)** found that all age groups even 7 to 8 years old and girls were more attracted to video games with restrictive age labels and violent-content labels.

Conclusion

The prevalence of IGD in this sample was relatively moderate as compared to previous studies and overcrowding, bad relation with father, parents limit on gaming time and suffering from chronic disease were predictors of IGD.

Recommendations

- Designing and implementing tailored innovative interventions for adolescents with internet gaming disorder.

- Further research to replicate the current study on a wider scale in Egypt for generalization of the findings.

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Competing interests

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