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Prevalence and Associated Factors of Internet Gaming Disorder among Residents in Saudi Arabia: A Cross-Sectional Study

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Abstract: Objective: Internet gaming disorder (IGD) is an emerging psychiatric disorder that has received attention over the past decade. Few studies have attempted to describe this disorder in the Saudi population. This study aimed to examine the prevalence of IGD and associated factors. A cross-sectional study was conducted using a translated Arabic and validated questionnaire targeting both genders in Saudi Arabia. **Methodology:** A cross-sectional study using a validated questionnaire (IGD-20) and targeting Arabic speaking children, youth, and transitional age including both genders. A snowball approach was used to sample our population using electronic survey. Logistic regression was used to examine factors associated with IGD diagnosis. The study was guided by STROBE statement. **Results:** A total of N = 419 participants were included in the study, 17.56% of whom met the criteria for IGD. The prevalence of IGD among males (17.41%) was similar to the rate for females (16.92%). The age group younger than 18 had a significant positive correlation with the IGD score (p=0.0041). Participants with more weekly playing time had a significant positive correlation with IGD score (p=0.0001). **Conclusion:** IGD prevalence was significantly high among children, youth, and transitional age groups. Both males and females were affected similarly.

Keywords: gaming; IGD; adolescents; children; adult; internet; Saudi Arabia

1. Introduction

In 2013, the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) recognized Internet Gaming Disorder (IGD) as a potential disorder requiring further research. The newly proposed mental illness was defined as persistent and recurrent use of internet games causing clinically significant impairment or distress [1]. However, the prevalence of IGD is uncertain mainly because the disorder has only recently been recognized. In addition, multiple terms have been identified as referring to IGD in many systematic reviews of the related literature. Furthermore, IGD screening often includes pathological or problematic gaming, gaming disorder, or gaming addiction and cited the overall prevalence as 0.7% to 27.5%, based on 37 cross-sectional studies and 13 longitudinal studies [2]. While the prevalence of IGD was examined in many countries, Saudi Arabia was not included.

Factors linked to IGD points to male gender predominance [3,4]. Moreover, gender differences have been revealed through neuroimaging, which showed more brain activity during gaming in males than in females [5]. Interestingly, changes in brain morphology and activity similar to the

changes associated with drug addiction [6–9] impulsivity, poor error processing, and diminished behavioral response inhibition associated with gaming, aggression, low sociability, and self-efficacy, and lower satisfaction with life [10,11]. Similarly, depressive, musculoskeletal, and psychosomatic symptoms increase with additional time spent playing video games, with sleep problems being common [11,12].

Furthermore, various familial factors have also been associated with gaming behaviors, such as low paternal adaptability for the regulation of gaming practices [13]. Also, problematic adolescent gamers have more screens in their homes, more family conflict, and fewer relationships, and have less cohesion than non-problematic gamers. Moreover, although accessibility is not a risk factor for IGD in males, accessibility has been positively associated with IGD in females. Rules and punishments related to gaming are negatively associated with IGD, whereas parental monitoring of time spent on gaming is positively associated with IGD [14]. However, a recent publication by Han D, et al showed that improving family cohesion plays a positive role in the management of IGD [15].

The IGD-20 has been widely adopted as a screening tool for IGD. A recent systematic review evaluated its use—more specifically, compared the IGD-20 with other tools—by examining its implementation in 8 studies with a total sample size of 5,454 [16]. According to the results, overall, no tool was found to be superior. In this study, we aimed to assess the prevalence of IGD in Saudi children (ages 10–14), youth (ages 15–24), and individuals (25 and older) and associated predictors of this disorder using the Arabic version of IGD-20.

2. Methods

2.1. Study Design and Settings

Our online survey was created using Google Forms, and the link was distributed using Twitter ads (https://ads.twitter.com/login?ref=en-btc-how-twitter-ads-work) to reach our first targeted population. Using Twitter Ads filters, we specified the criteria for selecting our first targeted populations using following eligibility filters: (1) participants living in Riyadh city, Saudi Arabia; (2) Participants older than 10 years of age. This approach used was based on restrictions imposed on the public due to the COVID-19 pandemic and the exploratory nature of this study. In addition, this sampling method takes advantage of the power of high social media utilization among the Saudi population [11]. This study was approved by the Institutional Review Board of the King Saud University Medical City (KSUMC), Riyadh, Saudi Arabia, in January 2020 (approval #20/0065/IRB). Informed consent was obtained electronically from the participants after the aims of the study were explained to them.

The choice of such an approach was based on the restrictions imposed on the public due to COVID and the exploratory nature of this study. Unlike traditional snowball sampling where social interaction occurs and a participant from a targeted group can recruit other participants with similar characteristics, Twitter enables researchers to recruit participants using snowball sampling through reaching a social network of targeted populations. Then, the users of the first targeted network repost or retweet to a different network of users who shared similar characteristics [17].

2.2. Study Population

Study participants included both male and female Arabic speakers living in Saudi Arabia. The targeted population was children (ages 10–14), youth (ages 15–24), and adults (25 and older) from all nationalities. We excluded participants who were under the age of 10 at the time of data collection, which took place from November 2020 through January 2021.

2.3. Instruments

The questionnaire includes two main sections: (1) sociodemographic characteristics and IGD-related characteristics, including age, gender, family income, amount of time spent with family/parents, approximate time spent playing video games weekly, and favorite platform for playing video games. (2) Validated Arabic version of the Internet gaming disorder (IGD-20) tool [18],

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which was a Likert-scale-based tool composed of 20 items reflecting the nine criteria of IGD as outlined in the DSM-5.

We slightly modified wordings of 4 of the IGD-20 questions for cultural appropriation. We conducted a piloting phase, during which we received survey responses from 45 participants; those responses were not included in the results for this study. The IGD precipitants were identified by summing the scores of the 20 items, with a threshold of 71 or greater considered positive, which yielded the optimal specificity and sensitivity [19]. Based on a previous by Hawi et al. [24], the following cut-off scores were used to identify three different groups: those with an internet gaming disorder (IGD) scoring 71 points or higher, at-risk of internet gaming disorder (RIGD) scoring between 50 and 70, and those with non-internet gaming disorder (Non-IGD) scoring below 50 on the IGD-20.

2.4. Statistical Modeling

Descriptive analyses of variables were performed for the IGD and non-IGD groups. Using multiple linear regression, we explored the association between IGD and the following sociodemographic variables: age, gender, nationality, residency city (Riyadh or other), number of siblings, family income, and time spent playing video games weekly. Data were analyzed using R statistical language and Prism software.

3. Results

Table 1 presents the frequencies of categorical and numerical variables per IGD-20 group of the survey participants. A total of 419 individuals participated in the study. Using the modified IGD-20 assessment, 171 were classified as non-IGD, 167 were RIGD and 72 were IGD were it can be shown in Figure 1. There is a significant association ($X2=10.096$, $p<0.01$) which can be shown in Figure 2 between IGD-20 groups and categorical age groups. Most participants, 74.3% in the non-IGD group were above 18 years old. However, in the RIGD and IGD groups, almost half of the participants were older than 18 years old with 59.7% and 58.3% respectively. We observed no association between gender and IGD diagnosis. Among our sample, the percentages shown in Figure 3 of males (54.2%) and females (45.8%) who met the criteria for IGD were similar. There is no significant association between IGD diagnosis and gender, nationality, residence and family income. Time Playing Per Week was significantly associated with IGD diagnosis ($X2=49.256$, $p<0.01$). In the IGD group 30.6% played more than 20 hours per week, while 6.9% played 1 hour or less per week. In contrast, in the non-IGD group 5.3% played more than 20 hours per week and 38% played 1 hour or less per week. Using numerical variables, age was not significantly associated with IGD diagnosis. The mean age in the non-IGD, RIGD and IGD groups were 22.322, 20.511 and 22.111, respectively.

Table 1.

IGD Diagnosis	Non-IGD (N=171)		RIGD (N= 176)		IGD (N=72)		Chi-squared test
Categorical variables	**N**	**%**	**N**	**%**	**N**	**%**	
Age Group							
18 years old or younger	44	25.70%	71	40.30%	30	41.70%	X2=10.096***
Older than 18 years old	127	74.30%	105	59.70%	42	58.30%	
Gender							
Female	80	46.80%	82	46.60%	33	45.80%	X2=0.019
Male	91	53.20%	94	53.40%	39	54.20%	
Nationality							
Saudi	157	91.80%	165	93.80%	69	95.80%	X2=1.404
Non-Saudi	14	8.20%	11	6.20%	3	4.20%	
Residence							
Riyadh	94	55%	96	54.50%	45	62.50%	X2=1.459

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Other	77	45%	80	45.50%	27	37.50%	
Family Income							
Less than 5000 Riyals	23	13.50%	30	17%	7	9.70%	
5000 to 9999 Riyals	45	26.30%	50	28.40%	21	29.20%	X2=3.567
10000 to 14999 Riyals	44	25.70%	37	21%	16	22.20%	
More than 15000 Riyals	59	34.50%	59	33.50%	28	38.90%	
Time Playing Per Week							
1 hour or less per week	65	38%	39	22.20%	5	6.90%	
2 to 6 hours per week	67	39.20%	58	33%	25	34.70%	X2=49.256***
7 to 19 hours per week	30	17.50%	48	27.30%	20	27.80%	
20 hours or more per week	9	5.30%	31	17.60%	22	30.60%	
Numerical variables	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**F-test**
Age	22.322	6.877	20.511	6.024	22.111	11.219	F=2.801*
IGD-20 Questions							
1. I often lose sleep because of long gaming sessions	2.468	1.144	3.432	0.948	4.056	0.902	F=72.539***
2R. I never play games in order to feel better.	2.76	1.22	3.193	0.996	3.5	1.035	F=13.405***
3. I have significantly increased the amount of time I play games over last year	2.17	1.193	3.352	1.176	4.111	1.069	F=84.122***
4. When I am not gaming, I feel more irritable	1.351	0.681	2.381	0.943	3.639	1.179	F=173.542***
5. I have lost interest in other hobbies because of my gaming	1.55	0.855	2.869	1.121	4.097	0.995	F=181.281***
6. I would like to cut down my gaming time but it's difficult to do so	1.918	1.008	3.182	1.053	4.097	1.103	F=128.27***
7. I usually think about my next gaming session when I am not playing	1.942	0.944	3.034	0.881	4.194	0.781	F=173.459***
8. I play games to help me cope with any bad feelings I might have	2.643	1.272	3.648	1.157	4.292	1.013	F=58.889***
9. I need to spend increasing amounts of time engaged in playing games	2.076	1.035	2.869	0.913	3.889	1.082	F=87.635***
10. I feel sad if I am not able to play games	1.38	0.712	2.443	1.001	3.917	1.045	F=205.96***
11. I have lied to my family members because of the amount of gaming I do	1.351	0.699	2.483	1.126	3.75	1.275	F=153.249***
12. I do not think I could stop gaming	1.749	1.035	2.858	1.104	4.25	0.765	F=157.44***
13. I think gaming has become the most time-consuming activity in my life	2.105	1.198	3.494	1.085	4.5	0.605	F=147.531***
14. I play games to forget about whatever's bothering me	2.778	1.31	3.79	0.942	4.222	0.967	F=56.953***
15. I often think that a whole day is not enough to do everything I need to do in games	1.637	0.852	2.636	1.033	4.153	0.944	F=182.147***
16. I tend to get anxious if I can't play games for any reason	1.491	0.722	2.591	0.981	3.986	0.971	F=210.8***
17. I think my gaming has jeopardized the relationship with my partner	1.626	0.908	2.42	1.05	3.486	1.1	F=90.073***
18. I often try to play games less but find I cannot	1.69	0.87	2.722	1.035	4.111	0.897	F=171.209***
19R. I know my main daily activity (i.e., occupation, education, homemaker, etc.)	2.222	1.341	2.608	1.176	3.097	1.302	F=12.591***

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has not been negatively affected by my gaming							
20. I believe my gaming is negatively impacting important areas of my life	2.082	1.195	3.335	1.104	4.139	0.893	F=104.146***

R = Reversely score items. Statistical significance markers: * p<0.1; ** p<0.05; *** p<0.01.

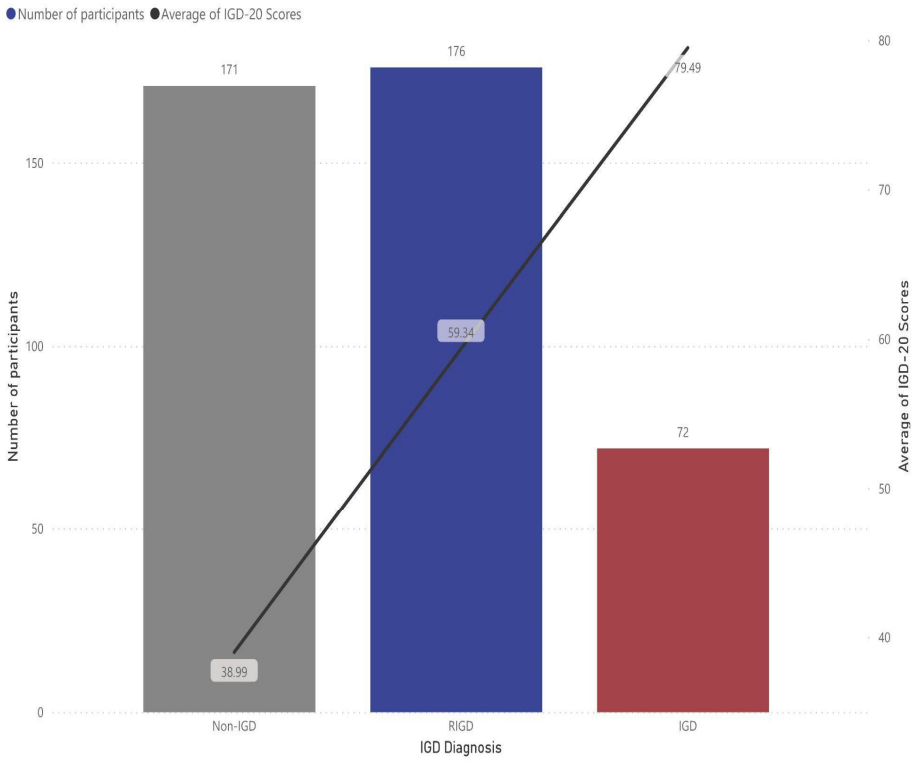

Figure 1.

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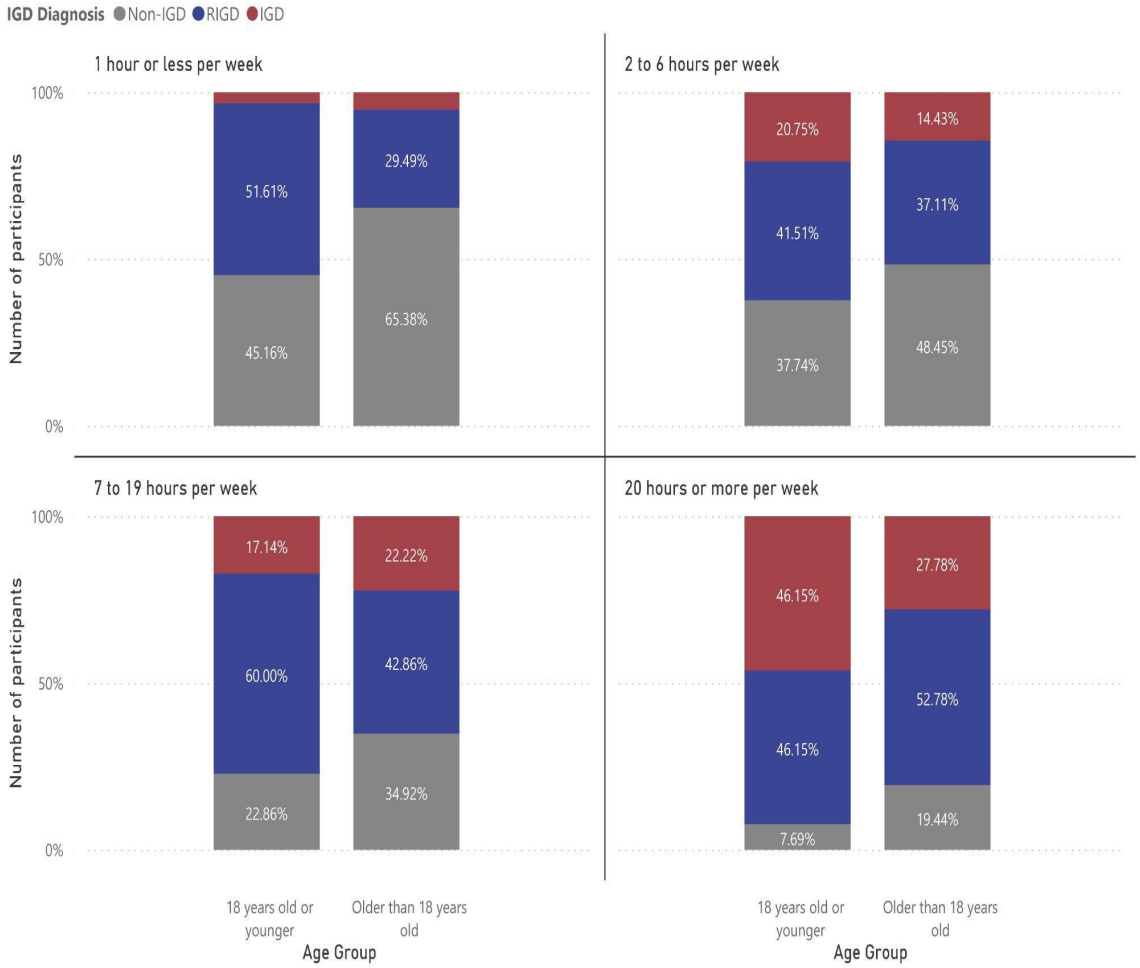

Figure 2.

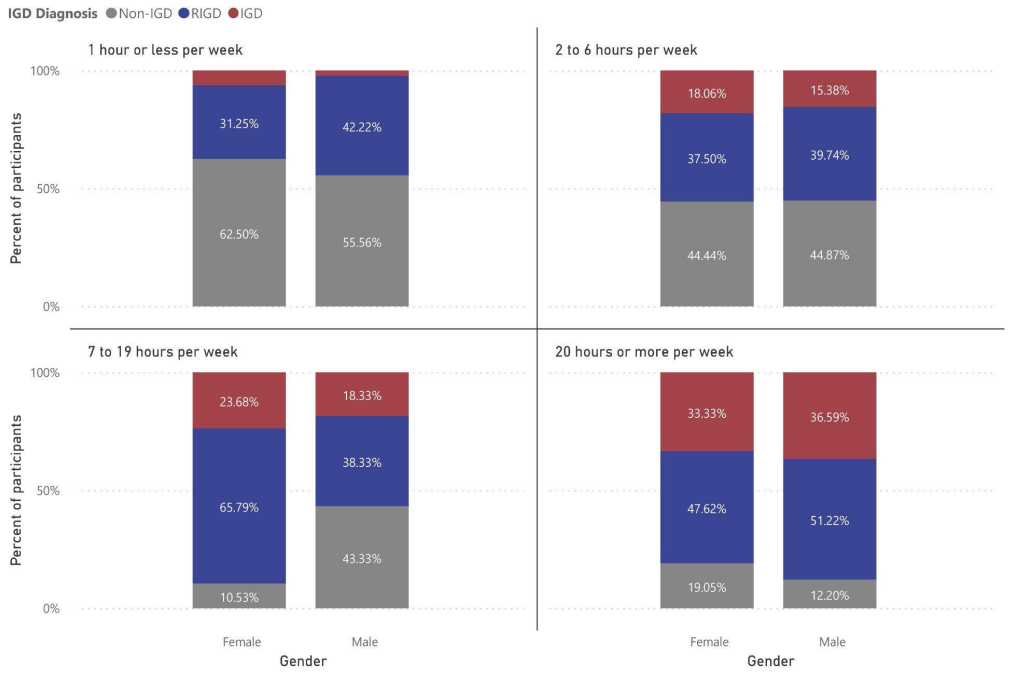

Figure 3.

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Also within Table 1 we present the results of the IGD-20 Questions by 5-point likert scale by: 1 "strongly disagree", 2 "disagree", 3 "neither agree or disagree", 4 "agree", 5 "strongly agree".

For question 1,3,5,6,7,8,12,13,14,15,18,20 most of the IGD population answered (4"agree"), with statements on the effect of IGD on our study population affecting sleep, tolerance to playing video games, loss of interest in other leisure activities, dependence on gaming, bad coping skills, and effecting function in a negative manner.

Table 2 shows the result of the linear regression analysis. Predictor relationship of "age category <18 years old" with IGD was significant and positive (b 4.54, P < 0.0001). Increased "playing time per week" also had a significant and positive relationship with IGD (b 7.548, P= 0.0001 for 2-6 hours/week, b11.83, P <0.0001 for 7-19 hours/week and b16.96 P<0.0001 for 20 hours/week or more). The rest of the variables (sex, nationality, city of residence, and family income) were not significant predictors.

Table 2. Regression analysis.

Parameters	Effect on slope		95% CI		P-value
	Estimate	SE	Lower limit	Upper limit	
Intercept	41.75	3.467	34.94 to	48.57	<0.0001
Age Category [18 years old or younger]	4.54	1.571	1.451	7.629	0.0041
Sex [Male]	-1.172	1.516	-4.153	1.808	0.4399
Nationality [Saudi]	3.903	3.053	-2.097	9.904	0.2017
Residence [Riyadh]	0.5297	1.516	-2.450	3.509	0.7269
FamilyIncome [10000 to 14999 Riyals]	-0.4199	2.542	-5.416	4.577	0.8689
FamilyIncome [More than 15000 Riyals]	-0.6377	2.379	-5.314	4.038	0.7888
FamilyIncome [5000 to 9999 Riyals]	0.719	2.439	-4.076	5.514	0.7683
TimePlayingPerWeek [2 to 6 hours per week]	7.548	1.93	3.755	11.34	0.0001
TimePlayingPerWeek [7 to 19 hours per week]	11.83	2.151	7.598	16.05	<0.0001
TimePlayingPerWeek [20 hours or more per week]	16.96	2.458	12.13	21.79	<0.0001

4. Discussion

The study objectives were to clarify the prevalence of gaming disorder among the age group 18 years old or younger and Older than 18 years old in Saudi Arabia and to investigate the association between the existence of the gaming disorder and various sociodemographic factors. To our knowledge, this is the first local study to compare the prevalence of IGD between children and adolescents (18 years old and younger) and adults (older than 18 years old). The percentage of our sample population who met the criteria of IGD using the IGD-20 scale was found to be 17.56%, which is double what was in the literature in the Arab region but similar to the UK prevalence [24]. Other

studies have found an international IGD prevalence ranging from 0.7% to 27.5% [20]. Yet, this high percentage can be explained by our sample size (58.30%) of the (IGD) sample population was older than 18 years old [24]. However, the percentage of at-risk IGD (RIGD) was (40.7%) similar to the literature in the Arab region [24].

In this sample, IGD prevalence was significantly higher among children and adolescents than among adults, 20.7% and 15.3%, respectively. This finding is consistent with previous studies that found increased IGD rates among children and adolescents [25]. Recent studies in Saudi Arabia found an increase in IGD prevalence among adolescents, accounting for 29.3% and 21.85% of their samples, respectively [26,27] . An earlier study among adolescent students in a governmental school found that out of the 2,537 participants, 130 (5%) had gaming addiction, 56.9% of whom were male [21]. Another study by Saquib et al., published in December 2017, covered video game addiction among international school students in Buraydah, Saudi Arabia [20]. The researchers conducted a cross-sectional questionnaire-based study using an 11-item video game addiction scale with three answer options (yes, no, and sometimes) based on the DSM-5 criteria. Of the 276 participants, 16% were found to have video game addiction [20]. Studies among university students in Saudi Arabia reported a range between 8.8% to 21.5% [22,28]. Several factors could explain the discrepancies in the reported prevalence between the different studies. These studies used different scales and cut-off scores to estimate the prevalence of probable IGD. Furthermore, the differing sample population could be another factor. This study collected data only a few months after the COVID-19 lockdown was lifted in Saudi Arabia, while some restrictive measures were still in place [29]. The pandemic impacted the gaming behaviors of children, adolescents, and young adults, and emerging literature reported an increased prevalence of IGD after the lockdown [30]. A study by Alsaad et al. found that 69.5% of the children and adolescents in their sample reported increased gaming behavior due to pandemic related-stress [31].

Except for the age group, no demographic factors were significantly different between those who screened positive for IGD and non-IGD individuals, and this has been observed in other studies as well. A Chinese study among 1000 adults showed no difference in marital status, age, gender, education, or employment between probable IGD and non-IGD gamers [32]. Another study by Kim et al. reported similar results with no significant relationship between sociodemographic factors and IGD among 3041 Korean adults [33]. Contrary to our results, a study among 450 Saudi adolescents found a positive association between male gender, school year, and lower maternal education level [26]. The non-significant findings in this study might be related to the small sample size and the inclusion of children, adolescents, and adults. However, these results shed light on the increasing vulnerability of young people and females to developing IGD.

Interestingly, this study showed no significant difference in the prevalence of IGD between males and females. This finding was an unexpected result, considering that more males than females play video games and considering that previous studies have indicated the male gender to be a significant risk factor for IGD [3,4]. This finding suggests that Saudi females are a growing group of video gamers. A study among 370 female university students in Al-Jouf, Saudi Arabia, found that approximately half had moderate to severe internet addiction [34]. A study among predominantly female college students in UAE found an increase in the prevalence of IGD across two-time points, and although this trend was observed among male participants as well, it was more pronounced among female students [35].

Most participants who screened positive for probable IGD endorsed that video games help them cope with negative emotions. This finding is in line with other studies that reported gaming to cope with negative emotions as a risk factor for IGD [36,37]. Easy access and popularity of internet gaming make it appealing for youth to use it as a coping strategy, which can be seen as negative reinforcement for IGD [36]. Longer average time in gaming was among the factors significantly associated with having probable IGD, with more than a third of them reporting an average playtime of more than 20 hours per week. Similarly, multiple studies reported longer average gaming as a risk factor for IGD [24,28]. A study by Severo et al. reporting on IGD prevalence among 555 Brazilian adolescents and

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young adults found that IGD was three times more likely among those who spend more than 20 hours gaming [38].

5. Conclusions

IGD prevalence was significantly high among the children, youth, and adult groups. Both males and females were affected similarly. Screening children and youth for IGD as part of mental health assessments is worth considering.

6. Limitations

This study was limited by the small sample size. Moreover, we used a voluntary response sampling via Twitter ad algorithms. The filters of Twitter ads were set to show the questionnaire to people older than 10 years of age and living in Riyadh, Saudi Arabia; no filters for people interested in gaming or similar activities were used to avoid selection bias. Finally, although many studies have shown that some game genres are more addictive than others, we did not consider game genres as a variable in this study.

7. Future Studies

As this current study is the first study to measure IGD prevalence among the Saudi population, we decided not to limit our population to a single age group (e.g., young group). However, we highly suggest that future studies focus on evaluating the IGD prevalence and risk factors among the young population, especially with the current increased exposure to the use of technology and the internet in daily settings and education during and after the COVID-19 pandemic.

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Institutional Review Board Statement: The study was approved by the Institutional Review Board at King Saud University (approval #20/0065/IRB). All participants provided written consent.

Data Availability Statement: All data for this study will be made available upon reasonable request.

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Conflicts of Interest: None declared.

Abbreviations:

IGD	Internet Gaming Disorder
IRB	Institutional Review Board
LR	linear regression
OR	odds ratio
APA	The American Psychological Association
DSM-5	The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition
IGD-20 Test	internet gaming disorder test
USD	US dollar
95% CI	95% confidence interval
PSP	PlayStation Portable

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