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Research article

Prevalence of Internet Gaming Disorder among Saudi Arabian university students: relationship with psychological distress

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ABSTRACT

Background and aim: Given the exponential growth of the gaming industry, Internet Gaming Disorder (IGD) merits further research. This study investigated the prevalence of IGD among Saudi Arabian university students and its relationship with the level of functioning, psychological distress, and potential for comorbid depression, as well as the effect of the COVID-19 lockdown on gaming behavior.

Materials and methods: 306 participants were randomly selected from various Saudi Arabian universities and surveyed using the 20-item Internet Gaming Disorder Test (IGD-20 Test), the Patient Health Questionnaire (PHQ-9), and the 6-item Kessler Psychological Distress Scale (Kessler-6).

Results: The estimated prevalence of IGD was 10.1%, and significantly higher risk was observed among IGD and respective at risk groups with psychological distress. Moreover, 67.4% of the participants reported an increase in playtime during the COVID-19 lockdown. Based on the Kesseler-6, psychological distress was observed in 19.9% of the participants.

Conclusions: This study suggests that IGD is a growing mental health risk associated with a dysfunctional impact and psychological distress.

1. Introduction

In 2013, the Diagnostic and Statistical Manual of Mental Disorders 5 (DSM-5) identified Internet Gaming Disorder (IGD) as an evolving and global mental health disorder that warrants further research. IGD diagnostic criteria include a preoccupation with gaming, withdrawal symptoms, low tolerance, lack of control, loss of other interests, deception, mood modification, gaming despite negative consequences, and dysfunction in major life domains. In 2018, the International Classification of Diseases (ICD-11) added gaming disorder to the list of disorders in the category of addictive behaviors (World Health Organization, 2021). In addition, multiple studies have suggested an association between IGD and negative mental and physical health implications such as depression, anxiety, and sleep disorders (Stevens et al., 2020).

In 2016 a study that included 276 Indian and Pakistani students attending international secondary schools in Buraydah city, Al-Qassim province, in Saudi Arabia showed that the prevalence of IGD was 16% (Saquib et al., 2017). Furthermore, a study conducted in Lebanon in 2016 involving 10 Lebanese high schools reported a prevalence rate of 9.2% based on a sample of 524 students using the IGD-20 Test (Hawi, N. S et al., 2018). In 2021, IGD prevalence among females attending colleges in the United Arab Emirates (UAE) was 1.45%, based on a stringent cutoff score of ≥ 40. The prevalence rate rose to 18.20% with a less stringent cutoff ($\geq = 21$). Although the rate of IGD increased between 2016 and 2019, the respective increase was not found to be statistically significant (Verlinden et al., 2021). Problematic Internet use/computer gaming has been reported among 10% of college students in the US, and is significantly correlated with mental health symptomatology (Stevens et al., 2020). In addition to the increasing prevalence rates, researchers have identified the negative impacts of IGD on academic achievement, time and money spent gaming, sleep duration, job or education, and other leisure activities (Kim et al., 2016; Müller et al., 2015). Furthermore, a

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recent systematic review and meta-analysis demonstrated that the prevalence of depression in participants with IGD varied considerably across studies, affecting approximately one-third of the participants (Ostinelli et al., 2021).

Another meta-analysis indicated that the prevalence of mental health issues in many countries increased after the COVID-19 outbreak (Nochaiwong et al., 2021). Multiple studies have focused on the impact of the COVID-19 lockdown on IGD. A study in Saudi Arabia showed a significant association between the COVID-19 lockdown and an increased duration of gaming among children and adolescents (Alsaad et al., 2021).

In Nepal, during the COVID-19 quarantine period, gaming behavior increased among medical college students (Shrestha et al., 2020). Another study in India revealed that approximately 50.8% of college students reported an increase in their gaming behavior, whereas 14.6% reported a decrease in their gaming habits during the lockdown period (Balhara et al., 2020).

A South Korean study compared adolescent gaming behavior before and after the COVID-19 pandemic in 2018 and 2020 and selected a four-model profile: "casual" gamer, "moderate" gamer, "potential-risk" gamer, and "addictive" gamer (Kim and Lee, 2021). The addictive gamer profile indicated a significant increase in gaming time after the pandemic began, whereas no significant signs of increased addictive Internet gaming were observed considering the other profiles (Kim and Lee, 2021).

This study aimed to further expand on the existing knowledge about the estimated prevalence of IGD in Saudi Arabia and to explore its relationship with multiple demographic attributes (i.e., nationality, gender, marital status, etc.), as well as the impact of the COVID-19 lockdown on gaming behavior. Furthermore, the study aimed to evaluate the relationship between gaming and psychological distress and depression.

2. Materials and methods

The present cross-sectional study involved both male and female undergraduate students studying in Saudi Arabian universities. The students were invited to participate in the study between September 2020 and June 2021.

The inclusion criteria comprised university students who: (1) were currently enrolled in the university; and (2) were undergraduate students. After applying a stratified random sampling method, a link to an electronic survey questionnaire was sent through SurveyMonkey® to the selected colleges after randomizing the respective email databases using the Randomizer application. The head of department of each university was contacted by email with a request to distribute the questionnaire among the students in the previously chosen departments. In the absence of a response, the students were contacted through the curriculum coordinator.

A pilot study was conducted among 35 university students to estimate the time required to fill the questionnaire and to evaluate potential language issue prior to the study. The pilot study yielded only minor typing errors, and no major changes were required. The sample was not included in the study analysis.

The study questionnaire included questions on demographics and gaming patterns. Questions on gaming patterns focused on the frequency and pattern of gaming habits. Three psychological measures were used: the first was the 20-item Internet Gaming Disorder Test (IGD-20) (Pontes et al., 2014), Patient Health Questionnaire (PHQ-9), and Kessler Psychological Distress Scale (K-6). The IGD-20 is the first standardized psychometric tool to assess IGD according to the criteria suggested by the American Psychiatric Association in the latest edition of the DSM-5 on gaming disorders (Pontes et al., 2014). The IGD-20 questions cover salience, mood modification, withdrawal symptoms, conflict, and relapse (Hawi and Samaha, 2017; Pontes et al., 2014). Each question can be scored from 1 to 5, resulting in minimum and maximum total scores of 20 and 100, respectively; the diagnostic cutoff point for IGD is 71. The tool was translated into Arabic using a Lebanese sample (Hawi and Samaha, 2017). The translated version was then tested and demonstrated excellent psychometric properties (Hawi and Samaha, 2017; Pontes et al., 2014). Participants were classified as either having IGD (IGDG; scoring 71 or more on the IGD-20), being currently at risk of IGDG (IGDG; scoring between 50 and 70 on the IGD-20), or the casual gaming group (IGD score below 50), which represented those who did not meet IGD criteria (Hawi and Samaha, 2017; Pontes et al., 2014).

The second scale used was the PHQ-9, one of the most widely used clinical diagnostic instruments to screen for depression in primary health care. The translated version of the PHQ-9 (Alhadi et al., 2017) showed good internal consistency, with a Cronbach's alpha of 0.857. The PHQ-9 captures depression severity, and the overall scale scores are computed as a sum of the nine items (possible range: 0–27). The prorated scores can be obtained for a minimum of seven items with valid responses (American Psychiatric Association, 2013). The corresponding severity categories were originally defined as none (PHQ-9 scores 0–4), mild (PHQ-9 scores 5–9), moderate (PHQ-9 scores 10–14), moderately severe (PHQ-9 scores 15–19), and severe (PHQ-9 scores 20–27) (Easton et al., 2017; Richardson et al., 2010).

The third scale was the six-item Kessler Psychological Distress Scale (K-6), which is a well-validated clinical measure of psychological symptoms. It is used to measure the extent and severity of generalized distress in the preceding month (Aggarwal and Pandian, 2019; Elnahas et al., 2018). The scale is easy to use and showed high predictability and good psychometric properties. The scale was translated into Arabic in 2017 by Easton et al. (2017). K-6 measures the following emotions: nervousness, hopelessness, restlessness, jumpiness, sadness, and

Table 1. Distribution of participants according to demographic characteristics and scale variables (n = 306).

Age	
Mean (SD)	21.0 (1.9)
Range	17.0–30.0
Nationality	
Saudi	296 (96.7%)
Non-Saudi	10 (3.3%)
Gender	
Male	147 (48.0%)
Female	159 (52.0%)
Marital Status	
Single	287 (93.8%)
Married	17 (5.6%)
Divorced	2 (0.7%)
Specialty	
Medical	134 (43.8%)
Non-Medical	172 (56.2%)
Internet Gaming Disorder (IGD-20)	
Mean (SD)	48.5 (14.6)
Range	20.0–90.0
Casual Gaming	200 (65.4%)
At risk of IGD	75 (24.5%)
IGD Group	31 (10.1%)
Kessler Psychological Distress (K-6)	
Mean (SD)	7.9 (5.5)
Range	0.0–24.0
Normal	245 (80.1%)
Mental illness	61 (19.9%)
Patient Health Questionnaire (PHQ-9)	
Mean (SD)	7.7 (5.2)
Range	0.0–27.0
Normal	56 (18.3%)
Mild	169 (55.2%)
Moderate	40 (13.1%)
Moderately Severe	28 (9.2%)
Severe	13 (4.2%)

worthlessness. Each item of the K-6 questionnaire consists of responses graded on a five-point Likert-type intensity scale as follows: none of the time (0); a little of the time (1); some of the time (2); most of the time (3); and all of the time (4). The total score is the sum of the responses and ranges from 0–24 (Aggarwal and Pandian, 2019; Elnahas et al., 2018).

2.1. Study outcomes

The primary focus of the study was to estimate the prevalence rate of IGD using the IGD-20 tool. The secondary outcome was the identification of the socio-demographic predictors of IGD and its associations with depressive symptoms and psychological distress. .

2.2. Statistical analysis

Data were analyzed using the SPSS program (version 26). Qualitative data were expressed as numbers and percentages, and the Chi-squared test (χ^2) was used to assess relationships between the categorical variables. Quantitative data were expressed in terms of their mean and standard deviation (Mean ± SD). The Kruskal–Wallis test was used to compare the mean ranks of study variables among the different levels of (IGD-20), followed by Dunns non-parametric multiple comparisons test if found statistically significant. A multinomial logistic regression analysis was conducted to assess whether any of the study variables had a significant effect on the odds of observing each category of IGD relative to causal gaming. A P-value of less than 0.05 was considered statistically significant.

2.3. Sample size calculation

PASS (2021), v21.0.3 (Power Analysis and Sample Size Software) was used to estimate the sample size. A minimum sample of N = 300 was required to model primary outcome (Internet Gaming Disorder) that include 14 predictors and control variables for detecting a small effect size ($R^2 = 0.10$) at a probability level of 0.05 and a power of 80%.

3. Results

3.1. Baseline characteristics

A total of 306 participants were included in this study with a mean age of 21 ± 1.9 years, 52% of whom were females. About 94% of the cohorts were single and around 44% were enrolled in health specialty (Table 1).

Table 2 outlines the gaming patterns of the participants. Only 19.6% of the participants reported not playing video/mobile games, whereas 41.2% reported playing it within the last three years. Of those playing video/mobile games (n = 246), the mean number of played games was 2.6 ± 1.8. 89.8% of the respondents (n = 221) stated that they required an Internet connection in order to play games, and 96.7% played at home. Among the latter, 17.9% had an average playtime of ≥5 h per day during weekdays, 36.9% had an average playtime of ≥5 h during the weekend. 19.9% had an average sleep time of 6 h per day during weekdays and 38.6% students had an average sleep time of more than 8 h during the weekend (Table 2).

Table 3 describes the distributions of circumstances of respondents related to gaming. Most of the participants who played video/mobile games did so with friends (n = 159, 60%). Overall, 24.8% of the participants spent 100–200 SAR on games per month, out of those who spent money on gaming 66.5% used their university support stipends, and 72.8% reported that gaming did not affect their finances. Table 3 shows that, of the participants, 67.5% reported an increase in playtime during the COVID-19 lockdown, of whom 23.2% reported an increase in playtime by more than 4 h. Moreover, 43.1% of the participants indicated having a free time as the main cause. Among those who reported lower gaming time, 53.1% reported that the decrease was less than 1 h; according to 24.8% of the participants the decrease was because of the changes in their daily routine. Overall, 74% of the participants agreed or strongly agreed that playing video games helped reduce the lockdown-induced distress. Details are summarized in (Table 3).

Table 4 describes the differences and relationships of the study variables in association with the classification regarding IGD. The median

Table 2. Distribution of participants according to gaming patterns.

				Overall (n = 306)			
Playing video/mobile games							
During Lockdown				53 (17.3%)			
In the last year				7 (2.3%)			
Within the last two years				26 (8.5%)			
Within the last three years				126 (41.2%)			
More than three years				34 (11.1%)			
I do not play				60 (19.6%)			
Those who Play video/mobile games				**(n = 246)**			
Number of video games regularly played							
Mean (SD) Range				2.6 (1.8) 1.0–6.0			
Need internet connection to play							
Yes				221 (89.8%)			
Play video games at							
At Home				238 (96.7%)			
Friend's House				3 (1.2%)			
Game store				4 (1.6.0%)			
	I do not play	1 h	2 h	3 h	4 h	5 h	≥5 h
Average play time per day during weekdays (Sunday-Thursday)	54 (22.0%)	39 (15.9%)	44 (17.9%)	38 (15.4%)	27 (11.0%)	18 (7.3%)	26 (10.6%)
Average play time during weekend (Friday-Saturday)	21 (8.5%)	23 (9.3%)	29 (11.8%)	38 (15.4%)	44 (17.9%)	23 (9.3%)	68 (27.6%)
	<3 h	**4 h**	**5 h**	**6 h**	**7 h**	**8 h**	**≥8 h**
Average sleep time per day during weekdays (Sunday-Thursday)	9 (3.7%)	14 (5.7%)	44 (17.9%)	49 (19.9%)	53 (21.5%)	48 (19.5%)	29 (11.8%)
Average sleep time during weekend (Friday-Saturday)	3 (1.2%)	7 (2.8%)	16 (6.5%)	31 (12.6%)	32 (13.0%)	62 (25.2%)	95 (38.6%)

Table 3. Distribution of participants according to the circumstances related to playing video/mobile games.

	Overall (n = 246)				
Usually play games with					
With friends	159 (60.0%)				
Alone	53 (20.0%)				
With gaming community	54 (20.0%)				
Amount of money spent on games per month					
No money	50 (20.3%)				
less than 100SR	82 (33.3%)				
100–200 SR	61 (24.8%)				
200-300SR	33 (13.4%)				
300–400 SR	9 (3.7%)				
400–500 SR	3 (1.2%)				
more than 500 SR	8 (3.3%)				
Source of money spent on games	**(n = 196)**				
Family	55 (28.8%)				
University Support	127 (66.5%)				
Part time Job	7 (3.7%)				
Others	2 (1.0%)				
How did gaming affect your finances					
No effect	179 (72.8%)				
Little effect	56 (22.8%)				
Moderate effect	10 (4.1%)				
Significant effect	1 (0.4%)				
During lockdown					
Daily play time increased	166 (67.5%)				
Daily play time decreases	11 (4.5%)				
No change on my daily play time	55 (22.4%)				
I stopped playing	14 (5.7%)				
	<1 hrs	**1-2 hrs**	**2-3 hrs**	**3-4 hrs**	**>4 hrs**
If it increased, by how much	62 (25.2%)	59 (24.0%)	46 (18.7%)	22 (8.9%)	57 (23.2%)
If it decreased, by how much	119 (53.1%)	63 (28.1%)	17 (7.6%)	8 (3.6%)	17 (7.6%)
Causes of increasing play time (Multiple Choice)					
Keep contact with others	32 (12.9%)				
To cope with the stress of lockdown	46 (18.5%)				
More free time	107 (43.1%)				
No other activities	63 (25.4%)				
Causes of decrease in play time (Multiple Choice)					
Financial issues	4 (1.9%)				
Routine changes	53 (24.8%)				
No desire to play	94 (43.9%)				
Replaced with other activities	63 (29.4)				
	Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
Believe playing video games reduces the stress of lockdown	7 (2.8%)	9 (3.7%)	48 (19.5%)	101 (41.1%)	81 (32.9%)

For Multiple Response question: Percentages of the responses are given.

value for K-6 was the highest in the IGD Group (Mdn = 19.00) followed by at risk of IGD (Mdn = 8.00) and casual gaming (Mdn = 7.00) group. A Kruskal-Wallis test showed this difference was statistically significant, H = 60.03, p < .001, using Dunns test all pairwise difference were also found to be significant between all the groups (p = < .001).

The median value for PHQ-9 scores was the highest in the IGD Group (Mdn = 8.00) followed by the casual gaming (Mdn = 7.00) and at risk of IGD (Mdn = 7.00) groups. A Kruskal-Wallis test showed this difference to be statistically significant, H = 21.54, p < .001. All pairwise comparisons were also found to be statistically significant at p value <0.05. However, no significant difference was observed with regard to participants' age.

The median value for Number of video games regularly played was the highest in the "At risk of IGD" group (Mdn = 2.00) followed by the IGD group (Mdn = 2.00) and casual gaming (Mdn = 1.00) group. A Kruskal-Wallis test showed this difference was statistically significant, H = 17.55, p < 0.001. Using Dunns test pairwise difference of at risk of IGD vs IGD group was not found to be significant (Z = 0.568, p = 0.570).

A Pearson's chi-square test of independence was performed to examine the association between nationality and IGD groups. The association between these variables was not statistically significant, χ^2 (2, n = 306) = 1.13, p = .570. Similarly, no associations were observed with gender, marital status or specialty χ^2 = 3.60, p = 0.165, χ^2 = 3.35, p = 0.187 and χ^2 = 0.72, p = 0.698 respectively.

A Pearson's chi-square test of independence was also performed to examine the association between IGD groups and starting of playing video mobile games. The association between these variables was statistically significant, χ^2 (10, n = 306) = 23.08, p = 0.010. Details of these results are summarized in (Table 4).

Table 5 shows the results of a multinomial logistic regression analysis was conducted to assess whether K-6 score, PHQ-9 score, number of

Table 4. Relationship between IGD-20 and Kessler Psychological Distress (K-6) Patient Health Questionnaire (PHQ-9), and participants' demographics (n = 306).

	Casual Gaming (n = 200)	At risk of IGD (n = 75)	IGD Group (n = 31)	Total (n = 306)	p value
Psychological Distress (K-6)					
Mean (SD)Median	6.2 (3.9)7.0	9.1 (5.5)8.0	16.1 (6.2)19.0	7.9 (5.5) 7.0	H = 60.033, P < 0.01[1]
Range	0.0–18.0	0.0–24.0	0.0–23.0	0.0–24.0	
Patient Health Questionnaire (PHQ-9)					
Mean (SD)Median	6.6 (4.1)7.0	8.6 (5.8)7.0	12.0 (7.1)8.0	7.7 (5.2)7.0	H = 21.538, P < 0.01[1]
Range	0.0–27.0	0.0–26.0	3.0–27.0	0.0–27.0	
Age					
Mean (SD)Median	20.9 (1.9)21.0	20.9 (1.9)21.0	21.7 (2.3)21.0	21.0 (1.9)21.0	H = 2.987, P = 0.23[1]
Range	17.0–30.0	18.0–28.0	19.0–28.0	17.0–30.0	
Nationality					
Saudi	194.0 (97.0%)	73.0 (97.3%)	29.0 (93.5%)	296.0 (96.7%)	χ^2 = 1.13, P = 0.57[2]
Non-Saudi	6.0 (3.0%)	2.0 (2.7%)	2.0 (6.5%)	10.0 (3.3%)	
Gender					
Male	89.0 (44.5%)	43.0 (57.3%)	15.0 (48.4%)	147.0 (48.0%)	χ^2 = 3.60, P = 0.17[2]
Female	111.0 (55.5%)	32.0 (42.7%)	16.0 (51.6%)	159.0 (52.0%)	
Marital Status					
Single	185.0 (93.0%)	73.0 (98.6%)	29.0 (93.5%)	287.0 (94.4%)	χ^2 = 3.35, P = 0.19[2]
Married	14.0 (7.0%)	1.0 (1.4%)	2.0 (6.5%)	17.0 (5.6%)	
Specialty					
Medical	85.0 (42.5%)	36.0 (48.0%)	13.0 (41.9%)	134.0 (43.8%)	χ^2 = 0.72, P = 0.70[2]
Non-Medical	115.0 (57.5%)	39.0 (52.0%)	18.0 (58.1%)	172.0 (56.2%)	
Number of video games regularly played					
Mean (SD)Median	2.0 (1.5)1.0	2.9 (1.9)1.0	2.9 (2.1)1.0	2.3 (1.7)2.0	H = 17.552, P < 0.01[1]
Range	1.0–6.0	1.0–6.0	1.0–6.0	1.0–6.0	
I started playing video mobile games					
During Lockdown	40.0 (20.0%)	10.0 (13.3%)	3.0 (9.7%)	53.0 (17.3%)	χ^2 = 23.08, P = 0.01[2]
In the last year	4.0 (2.0%)	2.0 (2.7%)	1.0 (3.2%)	7.0 (2.3%)	
Within the last two years	18.0 (9.0%)	5.0 (6.7%)	3.0 (9.7%)	26.0 (8.5%)	
Within the last three years	75.0 (37.5%)	36.0 (48.0%)	15.0 (48.4%)	126.0 (41.2%)	
More than three years	14.0 (7.0%)	16.0 (21.3%)	4.0 (12.9%)	34.0 (11.1%)	
I do not play	49.0 (24.5%)	6.0 (8.0%)	5.0 (16.1%)	60.0 (19.6%)	

[1] Kruskal-Wallis.
[2] Pearson.

Table 5. Relationship of Gaming disorder with various study factors using Multinomial Logistic Regression Model.

Gaming Disorder	Predictor	Estimate	SE	Z	p		95% Confidence Interval	
						Odds ratio	Lower	Upper
At risk of IGD vs Casual Gaming	Intercept	-2.7527	1.8249	-1.5084	0.131	0.0638	0.00178	2.27971
	Age	-6.73e−4	0.0813	-0.00827	0.993	0.9993	0.85212	1.17197
	Psychological Distress Scale (K-6)	0.1575	0.0441	3.57119	<.001	1.1706	1.07366	1.27632
	PHQ9_Score	-0.0202	0.0429	-0.47062	0.638	0.98	0.90103	1.06594
	Number of video games regularly played	0.2699	0.0827	3.26359	0.001	1.3098	1.11383	1.54031
	Gender:							
	Male – Female	0.561	0.308	1.82184	0.068	1.7525	0.95836	3.20471
IGD Group vs Casual Gaming	Intercept	-11.6893	2.9253	-3.99594	<.001	8.38E-06	2.71E-08	0.00259
	Age	0.283	0.1213	2.3323	0.02	1.3271	1.04622	1.68348
	Psychological Distress Scale (K-6)	0.434	0.0654	6.63315	<.001	1.5435	1.35768	1.75465
	PHQ9_Score	-0.0872	0.0562	-1.55235	0.121	0.9165	0.82097	1.02316
	Number of video games regularly played	0.3156	0.1338	2.35842	0.018	1.371	1.05476	1.78213
	Gender:							
	Male – Female	-0.0812	0.5396	-0.15054	0.88	0.922	0.32017	2.65495

Model Fit Measures: $\chi^2(10) = 119$, $p < 0.001$, McFadden $R^2 = 0.227$.

video games played had a significant effect on the odds of observing each response category of IGD categories adjusted for age and gender.

The results of the multinomial logistic regression model were significant, χ^2 (10) = 119.0, p < .001, suggesting that the predictors had a significant effect on the odds of observing at least one response category of IGD categories. McFadden's R-squared was calculated to examine the model fit, where values greater than 0.2 are indicative of models with excellent fit (Louviere et al., 2000). The McFadden R-squared value

calculated for this model was 0.227. Since the overall model was significant, each predictor was individually examined. The regression coefficient for Kessler-6 scores for the response category of at risk of IGD was significant, $B = 0.1575$, $Z = 3.57$, $p < .001$, suggesting that a one unit increase in K-6 scores would increase the odds of observing the at-risk category of IGD relative to casual gaming by 17.6%. Similarly, a one unit increase in K-6 scores would increase the odds of observing the IGD relative to casual gaming group by 54.3%. However no significant effect of PHQ-9 scores was observed on IGD categories when adjusted for other variables in the model. The regression coefficient for number of games played regularly in response category at risk of IGD was significant, $B = 0.2699$, $Z = 3.26$, $p \leq 0.001$, suggesting that with an increase in one game the odds of observing the at-risk category of IGD relative to casual gaming increased by 30.98% and 37.1% in IGD group relative to casual gaming.

4. Discussion

This study attempted to measure the prevalence rate of IGD among Saudi Arabian university students and its relationship with depressive symptoms and psychological distress. We also explored the association between IGD and other variables such as age, gender, average sleep time, average playtime, number of games played regularly, and money spent on gaming. The estimated prevalence of IGD (10.1%) was higher than the results reported in previous studies: 8.8% among Saudi Arabian university medical students (al Asqah et al., 2020), 9.3% among Egyptian university students (Elnahas et al., 2018), and 9% among medical and dental students in India (Aggarwal and Pandian, 2019); all of which used the short version of the IGD scale, whereas 9.2% among high school students in Lebanon using the IGD-20 scale (Hawi et al., 2018). Furthermore, two studies in Saudi Arabia found a 15.8% and 5% prevalence of IGD among adolescent students in an international school and a government school, respectively (Rajab et al., 2020; Saquib et al., 2017). However, other studies found a lower prevalence: 5.3% among US university students using the proposed DSM-5 criteria (Ohayon and Roberts, 2021), 5.9% among South Korean adolescents using a modified version of the Lemmings Game Addiction Scale for adolescents (Yu and Cho, 2016), 2.1% among Chinese middle school and university students using IGD-20 (Yu et al., 2019), and 1.2% among German adolescents using the Video Game Dependency Scale (Rehbein et al., 2015). A plausible explanation for the variation observed in the prevalence rates of IGD could be because of the use of different scales to measure IGD with different cutoff points and varied populations. Although a local study of medical students used a scale measuring the same criteria (al Asqah et al., 2020), their sample consisted of medical students. However, the current study sample consisted of university students across different disciplines. Prior studies have suggested that the lack of screen time monitoring among university students could increase IGD rates compared to young children, which may explain the difference in IGD rates reported by a local study among adolescents (Bonnaire and Phan, 2017; Stevens et al., 2020). This study found a positive association between IGD scores, average playtime, number of games played regularly, and average money spent on gaming in line with previous studies (Hawi et al., 2018; Rehbein et al., 2015). Although multiple studies have reported a higher prevalence among male participants compared to females (Elnahas et al., 2018; Fam, 2018; Hawi et al., 2018; King and Delfabbro, 2019), another study from the UAE found an increase in the prevalence of IGD among females (Verlinden et al., 2021). However, no such a difference was observed in this study which could be because of the limited sample sizes.

In comparison, only 4.4% reported a decrease in playtime during the lockdown. The two most-cited reasons for the increase in playtime were having more free time and coping with lockdown stress. These results are in line with recent studies investigating the effect of the lockdown on gaming behaviors. Two studies from India and Nepal found that 50.8% and 69.2% of medical students, respectively, reported an increase in gaming behavior and believed that gaming helped them cope with the stress related to the COVID-19 pandemic and lockdown (Balhara et al., 2020; Shrestha et al., 2020). Similarly, a study among Saudi Arabian children and adolescents reported that 69.2% of the participants had increased gaming behavior because of pandemic-related stress (Alsaad et al., 2021). A possible explanation for this increase in gaming behavior includes factors such as physical distancing, self-isolation, and increased reliance on computers and Internet access for education and communication (King et al., 2020; Stevens et al., 2020). Although some studies have suggested that increased participation in gaming could be considered a part of adaptive coping strategies during the lockdown, and the pandemic in general (Avena et al., 2021; King et al., 2020), this increase in gaming behavior may not always be favorable, especially among individuals who are vulnerable to developing problematic gaming behaviors and stress such as college students (Kim and Lee, 2021; King et al., 2020).

The association between IGD and mental health problems has long been reported in the existing literature, with depression and psychological distress being the most common problems, especially during the COVID-19 pandemic (Nochaiwong et al., 2021; Ostinelli et al., 2021). An Indian study on medical students found that 26.9% of the participants reported moderate to severe depression and 16.92% had generalized anxiety disorder during the pandemic (Balhara et al., 2020). The results of a study on Japanese medical students found that 15.9% and 7.2% of the participants had depression and generalized anxiety disorder, respectively (Nishimura et al., 2021). Other studies reported even higher rates of depression and anxiety among college students (31.2%: depression; 39.4%: anxiety; 26.0%: stress prevalence) based on a meta-analysis that assessed the psychological impact of COVID-19 on college students (Batra et al., 2021). This study found a slightly higher prevalence of depressive symptoms and moderate to severe levels of distress among 35.8% and 29.2% of the participants, respectively. Furthermore, participants with IGD reported higher prevalence of depressive symptoms compared to those without IGD. However, a significant association could not be determined between increased gaming behavior and the severity of depressive symptoms or psychological distress during the lockdown in this study. A possible explanation for this could be that the increase in gaming behavior was considered a coping method to counter the stress of lockdown and social distancing (King et al., 2020). However, the interaction between mental health issues and gaming has become even more complex during the COVID-19 pandemic, and further research is required in this regard.

Although the findings of the current study significantly add to our understanding of IGD and mental health problems among university students in Saudi Arabia during the COVID-19 pandemic, the results may not be generalizable to the entire population given the small sample size and convenient sampling and cross-sectional design. The use of self-administered questionnaires and subjective reports of time and duration of playing, which are known to be subject to methodical biases, is another potential limitation of the study. Additionally, future longitudinal designs are needed to further assess the relationship between IGD and mental health.

5. Conclusions

Overall, the results of the present study suggest that IGD is a prevalent issue among Saudi Arabian university students, with most of the students reporting increased gaming behavior during the COVID-19 pandemic. A positive relationship was identified between IGD and the severity of depressive symptoms and psychological distress. IGD frequency was higher among those with increased playtime, those who played more than one game, and those who spent more money on gaming. No significant association was found between IGD, age, gender, or sleep patterns. These results emphasize the importance of initiating programs that target the identification of those who are vulnerable to developing problematic gaming behaviors and design preventive interventions to help minimize the impact of such problems.

Declarations

Author contribution statement

Hussain Khrad; AbdulAziz Marhoomi; AbdulAziz Al-Shamrani; Aqeel Alkhiri; Doaa Bajabir: Conceived and designed the research.

Mahmoud Mosli: Analyzed and interpreted the data.

AbdulAziz Marhoomi; Aqeel Alkhiri; Doaa Bajabir: Contributed reagents, materials, analysis tools or data.

AbdulAziz Marhoomi; Aqeel Alkhiri; Doaa Bajabir; Mahmoud Mosli: Wrote the paper

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Data availability statement

Data associated with this study has been deposited at www.surveymonkey.com.

Declaration of interest's statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

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