

# Prevalence and factors associated with Internet gaming disorder among adolescents in Saudi Arabia

## A cross-sectional study

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### Abstract

This study aimed to assess the prevalence of internet gaming disorder (IGD) and its associated factors among a sample of adolescents in the Faifa governorate in the south of Saudi Arabia.

This was a cross-sectional study targeting intermediate and secondary school adolescent students in the Faifa governorate. Multistage sampling was performed to reach the required sample, where 9 schools were randomly selected, followed by the distribution of the questionnaire to all students at all levels. IGD was assessed using a validated Arabic version of the 20-item IGD scale. A chi-square test was used to evaluate the presence of statistical differences between sample demographic data and IGD.

Four hundred and fifty students participated in the current study, where 132 (29.3%) of them were classified as having IGD. The prevalence of IGD was associated with gender, year of study, maternal education status, and the number of hours spent online and playing with friends ( $P$  values 0.05). Analysis of the IDG items among the current sample indicated that most were at the conflict stage of IGD.

The IGD level identified in our sample is high compared to the published literature. Faifa is a mountainous region and, due to its geographical nature, there are limited public entertainment areas. Adolescents tend to spend more time at home, where they may be more exposed to IGD. This suggests the need for strategies to ensure early identification of those at risk of IGD and to provide preventive and treatment options for these students.

**Abbreviations:** IGD = Internet gaming disorder, SD = standard deviation, SPSS = Statistical Package for Social Sciences.

**Keywords:** addiction, adolescents, Internet gaming disorder, Jazan, Saudi Arabia

## 1. Introduction

Globally, internet gaming is on the increase due to the advancement of technology and higher internet speeds. The use of Internet gaming has been reported to vary between populations according to different socioeconomic characteristics.<sup>[1–3]</sup> Excessive internet gaming can lead to addiction, which can have social, psychological, and physical consequences.<sup>[4,5]</sup> According to the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders, internet gaming disorder (IGD) is defined as “the persistent and recurrent use of the Internet to engage in games, often with other players, leading to clinically significant impairment or distress”.<sup>[6]</sup> The etiology of IGD is not well understood. However, it has been suggested that higher levels of IGD are associated with impulsivity, lower social acceptance, lower academic achievement, higher aggressive tendencies, troubled parental relationships, and a higher risk of depression.<sup>[7]</sup>

Several studies have been conducted to investigate the prevalence of IGD. In a review by Gentile et al, the prevalence of IGD

among children and adolescents was reported to vary between 1% and 9%. This variation has been suggested to be the result of differences in age, country, and sampling characteristics.<sup>[7]</sup> However, more recent research indicates a higher prevalence of IGD.

In a recent Chinese investigation of 6379 adolescents aged between 15 and 25 years, the prevalence of IGD among study subjects was 17%.<sup>[8]</sup> In a similar, smaller-scale Brazilian study involving 555 students aged between 14 and 25, it was reported that IGD prevalence was 38.2%, while 18.2% were labeled gamers at risk of developing IGD.<sup>[9]</sup>

Studies assessing the prevalence of IGD in the Arab world are currently limited. In a recent report evaluating the prevalence of IGD among 228 medical students in Riyadh, Saudi Arabia, it was concluded that 8.8% of the sample population had IGD and 19.3% were labeled as players at risk of developing IGD.<sup>[10]</sup>

The prevalence of IGD in other regions of Saudi Arabia, including the South, is currently unknown. The prevalence of

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IGD is expected to vary according to regions due to social and geographical differences. Faifa is a mountainous region, 2 km above sea level, known for its tourist and agricultural activities. Due to its geographical nature, there are limited public entertainment areas, such as parks, malls, and cinemas. Thus, adolescents tend to spend more time at home, where they may be more exposed to internet gaming activities. Therefore, it is hypothesized that limited entertainment options may lead to a higher prevalence of IGD.

This study aimed to evaluate the prevalence of IGD and its associated factors among a sample of adolescents in the Faifa governorate in the south of Saudi Arabia.

## 2. Methodology

### 2.1. Study context

A cross-sectional study was conducted in Faifa, 1 of the 17 governorates in the Jazan region of Saudi Arabia. Data collection was performed between August 2018 and March 2019. This investigation targeted intermediate and secondary schools in Faifa City. The ages of adolescent students who belong to the targeted schools vary between 12 and 18 years. Data collection was initiated after securing ethical approval from the Institutional Review Board of the Jazan Hospital of the Saudi Ministry of Health (approval number 1804, dated April 2018). The recruitment of study subjects was completed after obtaining signed informed consent from the parents of all participants, while ensuring the confidentiality and privacy of both parents and students.

### 2.2. Data collection tool

Data were collected using a self-administered questionnaire that included 2 sections. The first part included demographic characteristics and other factors associated with IGD. The second part included 20 items on the IGD scale developed by Pontes et al.<sup>[11]</sup> In this study, an Arabic version of the questionnaire developed by Hawi and Samaha was used to suit the target population.<sup>[12]</sup> The validity, reliability, and scoring of the scale have been explained elsewhere.<sup>[11,12]</sup> However, before data collection began, a pilot study involving 30 adolescents who were not included in the survey was conducted to assess whether the questions were clear and could be understood by the students, as well as the time it took to complete the questionnaire.

The scoring of addiction levels and classification of students based on the presence of addiction was done in accordance with Pontes et al's recommendation; their suggested cut-off point of 71 points for the 20-item IGDA 20-item test was used to classify the sample into those who had or did not have IGD. The test developed by Pontes et al measures 6 factors: salience, mood modification, tolerance, withdrawal symptoms, conflicts, and relapse.<sup>[11]</sup>

### 2.3. Sampling and data collection process

The required sample size for this investigation was determined according to the following equation described by Swinscow and Cohen (2003):  $N = Z \times P^2 (1 - P) / D^2$ , where N is the calculated sample size, Z is the selected level of confidence, P (the estimated prevalence in the population) is 50%,  $1 - P = 1.96$ , and  $D = 0.05$ . The equation calculated a minimum sample size of 384 students. After accounting for a 15% nonresponse rate, the final sample size was increased to 450 students.

Three steps were taken to complete the data collection process. At the initial identification stage, the Directorate of Education in the governorate of Faifa was contacted to secure administrative approval to conduct the study in intermediate and secondary

schools. After securing their approval, they provided a list of schools and information on the number of students present at each school and their educational level.

In the subsequent approach stage, the student participants were obtained using multistage sampling. Nine schools were selected from 27 by simple random sampling. Then, 450 questionnaires and parental consent forms were printed and sent to the administration of each school, where they were instructed to distribute them, ensuring an equal representation of schooling levels.

Students were targeted if they were current students in the intermediate or secondary schools in which their parents consented. Students of other levels or whose parents did not consent to their participation were excluded. The students were advised to provide the questionnaire and consent forms to their parents; once the parents had consented to participate, the students completed the questionnaire. The students then returned the completed questionnaires to the administration of each school, who returned them to the researchers, thus completing the recruitment stage.

### 2.4. Data analysis

Data analysis was performed via the Statistical Package for the Social Sciences (SPSS) software, version 24. Descriptive statistics were used to summarize the study findings, and frequencies and percentages were used to summarize binary and categorical data. In addition to descriptive statistics, visualization of the IGD model of addiction components was performed using box plots using median and interquartile range (IQR) to describe the findings of the visualization. A chi-square test was used to evaluate the presence of statistical differences between sample demographic data according to the presence of IGD. A value of  $P \leq 0.05$  was considered statistically significant. To illustrate the distribution of the sample according to each factor, the sum of the item scores measured for each factor was calculated. Classification of continuous demographic variables was either dependent on the calculation of interquartile range, such as classification of family monthly intake, and number of siblings, or dependent on classifications performed in other similar investigations, such as classification of parental marital status,<sup>[13]</sup> classification of online gaming duration,<sup>[14]</sup> and classification of IGD level.<sup>[11]</sup>

## 3. Results

### 3.1. Participants characteristics

A total of 450 students participated in the current study. The demographic characteristics of the recruited students are displayed in Table 1. The sampling strategy ensured the relatively equal recruitment of students from both genders and all 6 educational levels. Twenty-nine students were married at the time of recruitment, and 3 students were either widowed or divorced.

When the students were asked whether their parents were educated, 88 (19.6%) of the respondents indicated that their parents were illiterate. The majority of students stated that their families had an income of <10,000 SR, their parents were married, and they had between 4 and 7 siblings. In addition, 189 (42%) students declared that they spent 4 or more hours on online gaming daily.

### 3.2. IGD item findings

Table 2 illustrates the distribution of the IGD test items among the recruited sample. Item 15, which measures the tolerance stage of addiction, showed the most common agreement among the respondents, indicating that gaming did not affect the main daily activities of the students. Items 19 and 20, which measure the conflict stage, also showed high levels of agreement.

**Table 1**  
**Demographic characteristics of 450 adolescents from Faifa governorate in the south of Saudi Arabia.**

	Frequency (%)
Gender	
Male	223 (49.6%)
Female	227 (50.4%)
Education Level	
1st year intermediate school	79 (17.6%)
2nd year intermediate school	71 (15.8%)
3rd year intermediate school	79 (17.6%)
1st year secondary school	70 (15.6%)
2nd year secondary school	71 (15.8%)
3rd year secondary school	80 (17.8%)
Marital status	
Single	418 (92.9%)
Married	29 (6.4%)
Divorced	2 (0.4%)
Widowed	1 (0.2%)
Father education	
Educated	362 (80.4%)
Illiterate	88 (19.6%)
Mother education	
Educated	355 (78.9%)
Illiterate	95 (21.1%)
Family monthly income	
<10,000SR	203 (45.1%)
Between 10,000 and 20,000 SR	183 (40.7%)
>20,000 SR	64 (14.2%)
Marital status of parent	
Parents are married	414 (92.0%)
Parents are separated	35 (7.8%)
Number of siblings	
3 or less	96 (21.3%)
Between 4 and 7	262 (58.2%)
>7	92 (20.4%)
Time spend on online games every day	
<1 hour	148 (32.9%)
2 to 3 hours	113 (25.1%)
4–5 hours	34 (7.6%)
6 hours and more	155 (34.4%)

Figure 1 illustrates the distribution of the sample responses according to the 6 domains. The highest median was related to the conflict stage, showing a median of 12 (IQR: 9–16). This was followed by the tolerance stage and the relapse stage, with medians of 9 (IQRs: 6–12). Finally, the lowest medians were related to stages of salience, mood modification, and withdrawal symptoms, with a median of 8 (IQRs: 6–12).

### 3.3. Internet gaming addictions findings

Table 3 illustrates the addiction status of the students according to their demographic characteristics. Among the recruited adolescents, the prevalence of IGD was 29.3% (132 students). Higher proportions of IGD were observed among male students (38.1%), students in their first (53.4%) or second year (47.1%) of intermediate school, those with an illiterate mother (37.9%), those who spent more than 6 hours a day on online gaming (69%), and those who reported favoring playing with friends (36.3%). These differences were statistically significant ( $P \leq 0.05$ ). Paternal education, family monthly income, parental marital status, and number of siblings were not significantly associated with IGD among the study sample.

## 4. Discussion

In this investigation, a cross-sectional study was conducted to assess the prevalence of IGD and its associated factors among

a sample of adolescents from a mountainous area in the south of Saudi Arabia. One hundred thirty-two (29.3%) adolescents were classified as having IGD. Factors associated with a high prevalence of IGD were gender, year of study, maternal education status, and the number of hours spent online and playing with friends. Analysis of the IDG items among the current sample indicated that most were at the conflict stage of IGD.

The findings of this research can be compared to similar local and international studies that assess the prevalence and risk of IGD among different populations. For example, in a smaller study conducted in Riyadh, Saudi Arabia, 281 medical students were recruited. A shorter 9-item scale of the IGD test was used, revealing an IGD prevalence of 8.8%, and the prevalence was higher among males.<sup>[10]</sup> This prevalence is much smaller than that in our study (29.3%), and we suggest this marked variation can be explained by differences in the implementation of the test and the older age of the sampled students.

Although studies assessing the prevalence of IGD in Saudi Arabia are limited, our investigation can also be compared to similar yet broader-scope studies assessing the prevalence of gaming or Internet addiction. For example, in a study assessing gaming addiction among adolescents in the Qassim region of central Saudi Arabia using a 7-item scale, it was reported that gaming addiction was 5% among a sample of 2675 intermediate and secondary school students.<sup>[13]</sup> It was also noted that the prevalence of gaming addiction was higher among male students ( $P \leq 0.05$ ). This is similar to the association detected between gender and IGD in this study, indicating that male students are likelier than female students to experience gaming or online gaming addiction.

In a study assessing the prevalence of internet addiction in female students at Jouf University, in the north of Saudi Arabia, moderate and severe internet addiction were found in 49.5% and 1.9% of the sample, respectively. Though the study did not assess gaming addiction, their research findings indicated that Internet addiction among female students was mainly related to communication purposes, suggesting that Internet gaming has limited influence on female students.<sup>[15]</sup>

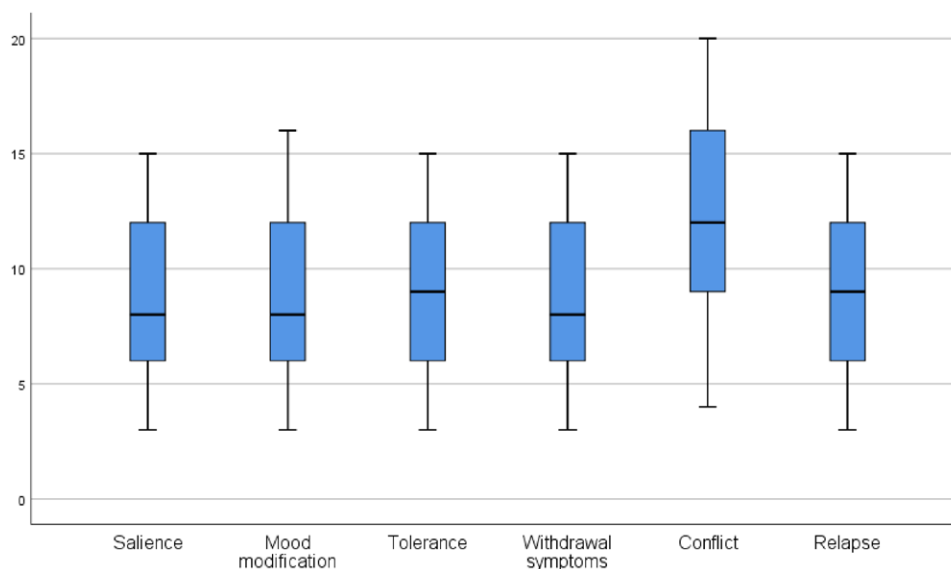
A similar Thai study by Taechoyotin et al assessed the prevalence of IGD using the same IGD 20-item test used in our investigation. They reported that, among a sample of 5497 secondary school students in a rural community, 5.4% were positive for IGD. It should be noted that this reported prevalence is smaller than the prevalence identified by our research. This may be explained by the demographic variation between the 2 studies.<sup>[16]</sup> In addition to detecting a similar gender influence on IGD as identified in our study, their research also found an association between smoking and alcohol consumption, which were not measured in our analysis. They also reported a correlation between addiction prevalence and higher Internet use, which is similar to our findings.

A Slovenian study by Macur and Pontes assessed IGD via a short 9-item psychometric scale among a sample of 1071 students with a mean age of 13.44 (SD = 0.59). Macur and Pontes classified their sample into high-risk gamers, low-risk gamers, and nongamers, and assessed their associated risk factors. Approximately 4.7% of the sample were labeled high-risk gamers, and most of them were male.<sup>[16]</sup> The proportion of high-risk gamers identified in their study is smaller than the identified IGD addiction prevalence found in our research, which we suggest is due to differences in methodology and analysis techniques.

A similar Chinese investigation by Liao et al used the video gaming dependency scale to assess the prevalence of IGD among 6376 Chinese adolescents aged between 15 and 25 years.<sup>[8]</sup> They found that the prevalence of IGD was 17%, which was lower than the prevalence identified in our sample. However, the researchers also found that gender and having a gaming partner were factors associated with a higher prevalence of IGD, which is consistent with our findings.

**Table 2****Distribution of IGD test items among 450 adolescents from Faifa governorate in the south of Saudi Arabia.**

Item: frequency (%)	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I often lose sleep because of long gaming sessions	99 (22%)	67 (14.9)	116 (25.8%)	74 (16.4%)	94 (20.9%)
I usually think about my next gaming session when I am not playing	105 (23.3%)	82 (18.2%)	101 (22.4%)	80 (17.8%)	81(18.0%)
I think gaming has become the most time consuming activity in my life	109 (24.2%)	82 (18.2%)	82 (18.2%)	85 (18.9%)	92 (20.4%)
I play games to help me cope with any bad feeling I might have	95 (21.1%)	135(30.3%)	69 (15.3%)	68 (15.1%)	83 (18.4%)
I never play games in order to feel better	115 (25.6%)	119(26.4%)	103 (22.9%)	70 (15.6%)	43 (9.6%)
I play games to forget about whatever's bothering me	105 (23.3%)	129(28.7%)	62 (13.8%)	78 (17.3%)	76 (16.9%)
I have significantly increased the amount of time I play games over last year	105 (23.3%)	82 (18.2%)	106 (23.6%)	80 (17.8%)	77 (17.1%)
I need to spend increasing amounts of time engaged in playing games	108 (24.0%)	82 (18.2%)	80 (17.8%)	97 (21.6%)	82 (18.2%)
I often think that a whole day is not enough to do everything I need to do in-game	112 (24.9%)	55 (12.2%)	69 (15.3%)	98 (21.8%)	116 (25.8%)
When I am not gaming I feel more irritable	95 (21.1%)	73 (16.2%)	77 (17.1%)	77 (17.1%)	128 (28.4%)
I feel sad if I am not able to play games	106 (23.6%)	58 (12.9%)	64 (14.2%)	81 (18.0%)	141 (31.3%)
I tend to get anxious if I can't play games for any reason	96 (21.3%)	57 (12.7%)	80 (17.8%)	88 (19.6%)	129 (28.7%)
I have lost interest in other hobbies because of my gaming	102 (22.7%)	53 (11.8%)	65 (14.4%)	82 (18.2%)	148 (32.9%)
I have lied to my family members because the amount of gaming I do	98 (21.8%)	38 (8.4%)	62 (13.8%)	83 (18.4%)	169 (37.6%)
I know my main daily activity (ie, occupation, education, etc) has not been negatively affected by my gaming	147 (32.7%)	58 (12.9%)	78 (17.3%)	94 (20.9%)	72 (16.0%)
I think my gaming has jeopardized the relationship with my partner	113 (25.1%)	48 (10.7%)	62 (13.8%)	78 (17.3%)	149 (33.1%)
I believe my gaming is negatively impacting on important areas of my life	116 (25.8%)	63 (14.0%)	74 (16.4%)	70 (15.6%)	127 (28.2%)
I often try to play games less but find I cannot	116 (25.8%)	61 (13.6%)	81 (18.0%)	83 (18.4%)	109 (24.2%)
I don't think I could stop gaming	127 (28.2%)	61 (13.6%)	73 (16.2%)	90 (20.0%)	99 (22.0%)
I often try to play games less but find I cannot	129 (28.7%)	88 (19.6%)	63 (14.0%)	66 (14.7%)	104 (23.1%)

**Figure 1.** Boxplots of the IGD model of addiction components among a sample of 450 adolescents from Faifa governorate, in the south of Saudi Arabia.

Although the predictors identified in our research were similar to those IGD predictors identified in other local and international studies, our investigation recognized a high prevalence of IGD disorder among adolescents in the governorate of Faifa. Given the methodological differences recognized in this discussion, the geographical constraints of the governorate of Faifa may have played a role in raising addiction levels, as students had less access to other social and entertainment alternatives.

Additionally, the data in this study were collected in 2018 and 2019, before the onset of the COVID-19 pandemic and its associated social distancing measures. Therefore, it is possible that addiction levels may have increased in Faifa, warranting a need for follow-up and more focus on this issue.

On a national level, the Saudi Ministry of Health recognizes the clinical and social impact of gaming addiction on children's health, and educational campaigns and materials have been

**Table 3**  
**Distribution of IGD status according to the sample characteristics among 450 adolescents from Faifa governorate, south of Saudi Arabia.**

Variable	Addiction: frequency (%)		Difference in proportions [95% CI of the difference]	Chi-square value [Degree of freedom]	P value*
	Yes	No			
Gender				16.45 [1]	<0.001
Male	85 (38.1%)	138 (61.9%)	23.8% [13.7%–33.9%]		
Female	47 (20.7%)	180 (79.3%)	58.6% [48.7–68.4%]		
Education level				34.19[5]	<0.001
1st year intermediate	28(53.4%)	51(64.6%)	30.1% [20%–40.1%]		
2nd year intermediate	34(47.9%)	37(52.1%)	4.2% [–5.9%–14.3%]		
3rd year intermediate	24(30.4%)	55(69.6%)	39.2% [29.1%–49.2%]		
1st year secondary	22(31.4%)	48(68.6%)	37.2% [27.1%–47.2%]		
2nd year secondary	19(26.8%)	52(73.2%)	46.4% [36.4–56.3%]		
3rd year secondary	5(6.3%)	75(93.8%)	87.5% [78%–96.9%]		
Father education				0.04 [1]	0.897
Educated	107(29.6%)	255(70.4%)	40.8% [30.8%–50.8%]		
Illiterate	25(28.4%)	63(71.6%)	43.2% [33.2%–53.1%]		
Mother education				4.25 [1]	0.043
Educated	96(27.0%)	259(73.0%)	46% [36%–55.9%]		
Illiterate	36(37.9%)	59(62.1%)	24.2% [14.1%–34.3%]		
Family monthly income:				0.09 [2]	0.969
<10000SR	59(29.1%)	144(70.9%)	41.8% [31.8%–51.7%]		
Between 10,000 and 20,000 SR	55(30.1%)	128(69.9%)	41.8% [31.8%–51.7%]		
>20,000 SR	18(28.1%)	46(71.9%)	43.8% [33.8%–53.7%]		
Marital status of parent				2.66 [1]	0.122
Parent are married	125(30.2%)	289(69.8%)	36.6% [29.5%–49.6%]		
Parent are separated	6(17.1%)	29(82.9%)	65.8% [56%–75.5%]		
Number of siblings				0.27 [2]	0.880
3 or less	28(29.2%)	68(70.8%)	41.6% [31.6%–51.6%]		
Between 4 and 7	75(28.6%)	187(71.4%)	42.8% [32.8%–52.7%]		
More than 7	29(31.5%)	63(68.5%)	37% [26.9%–47%]		
Time spend on online games every day				182.97 [3]	<0.001
<1 hour	19(12.8%)	129(87.2%)	74.4% [64.7%–84%]		
2–3 hours	3(2.7%)	110(97.3%)	94.6% [85.2%–103%]		
4–5 hours	3(8.8%)	31(91.2%)	83.3% [73.8%–92.7%]		
6 hour and more	107(69.0%)	48(31.0%)	65% [54.8%–75.1%]		
Best way for playing				20.1 [1]	<0.001
Play collectively with friend online	105(36.6%)	182(63.4%)	26.8% [16.7%–36.8%]		
Play individually	27(16.6%)	136(83.4%)	66.8% [57%–76.5%]		

\*Chi-square test.

provided to publicize gaming addiction and its associated health concerns.<sup>[17,18]</sup> Nevertheless, it might be beneficial to emphasize the role of primary healthcare centers and family physicians in the early identification of high-risk gamers. This role could be extended to include aspects of better communication between children and their parents, and clinical and psychological guidance on overcoming gaming addiction and its associated consequences. The fact that most students in this study were in the conflict stage of IGD indicates the need for professional guidance for recovery.

Our research has many strengths but also some limitations. The main strengths are the sampling strategy employed, which ensured a comparatively representative sample of the students from Faifa City, and the utilization of a validated 20-item scale to assess all factors relating to IGD. On the other hand, the main limitations are related to the inherent nature of the data collection tool, which depends on the students' recall and their ability to respond to the self-administered questionnaire. Nevertheless, the probability of recall bias and inability to respond to the questionnaire items was reduced by utilizing a validated Arabic version of the questionnaire and piloting it on a sample of the

targeted population. Additionally, the generalizability of this study is limited given the unique geographical nature of the area of the investigation, and it is possible to compare it to other regions in the country with similar geographic and socioeconomic characteristics. Finally, another area of limitations is related to other variables that can be associated with IGD that were not assessed in the current investigation, such as the possible influence of depression, anxiety, and stress on the prevalence of IGD among adolescents.

In conclusion, this research identifies a high prevalence of IGD compared to similar local and international research. Factors associated with a higher prevalence of IGD were gender, the year of study, maternal education status, and the number of hours spent online and playing with friends. Most study subjects were found to be in the conflict stage of IGD. This suggests a need for strategies to ensure the early identification of IGD among adolescents and to provide preventive and treatment options for such students. Finally, further research is needed to investigate this issue within the Faifa governorate and other governorates in the Jazan region, especially following the onset of the COVID-19 pandemic.

## Author contributions

AA was responsible for the study concept and design, development and testing of the data collection tool. SM and ME were responsible for data collection supervision, data entry. IG was responsible for data analysis and prepared the final draft of the manuscript.

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