Prevalence of Internet Gaming Disorder and Its Association With Loneliness and Leisure Boredom Among Malaysian Gamers During the COVID-19 Pandemic

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Although Internet Gaming Disorder (IGD) has been widely studied globally, its prevalence and psychosocial correlates in Malaysia, particularly in relationship to the COVID-19 pandemic, remain underexplored. This study therefore investigated IGD prevalence among Malaysian gamers and its associations with loneliness subtypes (emotional and social) and leisure boredom during the pandemic. A survey of 432 Malaysian gamers (mean age = 21.06 ± 2.90 years; 59.3% male) revealed a 19% prevalence rate of IGD, indicating that nearly one in five participants exhibited problematic gaming behaviors. Notably, the study found that emotional loneliness is a significant risk factor for IGD, while social loneliness and leisure boredom were not significantly associated. Daily gaming exceeding five hours was strongly linked to IGD, underscoring the importance of monitoring gaming duration. These findings highlight the need for targeted interventions addressing emotional support systems and time-management strategies to mitigate IGD risks in post-pandemic contexts. The discovery that emotional loneliness, rather than social factors or boredom, is a key driver suggests interventions should focus on fostering deeper emotional connections to reduce reliance on gaming as a coping mechanism.

Keywords

prevalence • loneliness • leisure boredom • Internet Gaming Disorder • COVID-19 • Malaysia

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Introduction

In response to the COVID-19 pandemic, measures such as physical distancing, lockdowns, and self-quarantine were implemented globally (Ko & Yen, 2020). With the closure of social activities, educational institutions, and businesses, many individuals turned to online activities, including gaming, as a coping mechanism (Ko & Yen, 2020; Chen et al., 2021; Elhai et al., 2021). While online gaming offers benefits such as stress relief and social connection, overindulgence can lead to adverse effects (Montag & Walla, 2016). The World Health Organization (WHO) partnered with the gaming industry to promote the #PlayApartTogether campaign, encouraging individuals to stay home and play video games while maintaining physical distance (Ellis et al., 2020). Coward-Gibbs (2021) found that online gamers shifted their social engagement to online mechanisms during lockdowns.

The number of internet users worldwide increased during the COVID-19 pandemic (Ellis et al., 2020; Király et al., 2020; Kemp, 2020). For instance, 22% of adults in the USA played online video games more often during the pandemic (Kemp, 2020). Ellis et al. (2020) reported an increase in average video game playtime from 16.38 to 20.82 hours per week across 66 countries. In Malaysia, internet usage rose from 87.4% in 2018 to 88.7% in 2020. Increased internet usage and more affordable broadband prices led to more time spent online (Malaysian Communication and Multimedia Commission, 2020). Ting and Essau (2021) reported a significant increase in gaming hours among Malaysians, from .95 hours per day before the pandemic to 1.33 hours per day during the pandemic.

Cross-sectional (e.g., Al Asqah et al., 2020; Guo et al., 2020; Siste et al., 2021) and longitudinal studies (e.g., Dang et al., 2019; Jeong et al., 2021) have explored the prevalence of IGD worldwide, with prevalence rates varying widely (.21% to 57.5% in the general population) (Darvesh et al., 2020). A meta-analysis reported a global IGD prevalence of 3.05% (Stevens et al., 2021). In Southeast Asia, Chia et al. (2020) reported a prevalence rate of 10.1%, while Yang et al. (2020) found that 13% of Chinese students were affected by IGD. Jaafar et al. (2021) reported a 52.8% IGD prevalence rate among university students in Malaysia. However, there are insufficient empirical findings regarding IGD prevalence in Malaysia during the COVID-19 pandemic.

Internet gaming has become a widely popular activity, but excessive or problematic gaming is often linked to psychological issues such as loneliness and boredom. Research indicates that individuals experiencing emotional and social loneliness may turn to gaming to cope with feelings of isolation and unmet social needs, as gaming provides a virtual environment that can temporarily fulfill social connection and emotional support (Wang et al., 2022). However, these virtual interactions may be superficial, potentially reinforcing addictive behaviors rather than alleviating loneliness in the long term (Yuan et al., 2024). Boredom also plays a significant role, as individuals may engage in gaming to escape monotony and seek stimulation, which can escalate into problematic use when gaming becomes the primary means of relief from negative emotions (Barr & Copeland-Stewart, 2022). The interplay of loneliness and boredom thus contributes to the risk of Internet Gaming Disorder (IGD), with gaming serving both as a coping mechanism and a potential source of further psychological distress (Li et al., 2021). During periods of increased isolation, such as the COVID-19 pandemic, these factors have been shown to intensify, highlighting the complex relationship between emotional states and gaming behavior (Wang et al., 2022).

The present study addresses this gap by investigating the prevalence rate of IGD among gamers in Malaysia during the COVID-19 pandemic and its associations with loneliness and leisure boredom. Given that IGD specifically affects individuals who engage in gaming, it is

essential to study this population directly to understand the disorder's prevalence and associated factors. Also, the literature suggests a relationship between loneliness, leisure boredom, and IGD; however, there is limited research focusing on Malaysian gamers during the pandemic. Therefore, this study aims to answer the following questions:

1. What is the prevalence rate of IGD among Malaysian gamers during the COVID-19 pandemic?
2. Is there a significant association between loneliness (emotional and social) and IGD among Malaysian gamers?
3. Does leisure boredom correlate with IGD among Malaysian gamers?

Loneliness and Internet Gaming Disorder

The two primary types of loneliness are emotional loneliness and social loneliness. Emotional loneliness is characterized by the feeling of lacking close relationships, which emphasizes the absence of meaningful emotional connections even when surrounded by social contacts. Individuals experiencing this type of loneliness often feel a sense of emptiness and a desire for more profound emotional ties with others. Social loneliness is characterized by a disconnection from one's social environment, particularly reflecting a deficiency in meaningful relationships and support systems. This feeling can persist even among individuals active on social media platforms, where interactions may often lack depth and fail to satisfy emotional and relational needs. This distinction was made clearly by Weiss in 1973 (DiTommaso & Spinner, 1997) and remains foundational in loneliness research.

Several studies conducted between 2017 and 2022 have demonstrated a significant relationship between emotional loneliness and Internet Gaming Disorder (IGD). For instance, a longitudinal study highlighted that loneliness is positively associated with online gaming addiction, suggesting that individuals experiencing emotional loneliness may increasingly engage in gaming as a coping mechanism (Gao et al., 2024). Research during the COVID-19 pandemic found that disordered gaming and loneliness, including emotional loneliness, intensified, with family harmony also playing a role in these dynamics (Wang et al., 2022). A study focusing on male university students revealed that loneliness and social anxiety are significant predictors of gaming addiction, emphasizing the role of emotional isolation in the development of IGD (Kuss & Griffiths, 2022). Additionally, research indicates that loneliness moderates the relationship between gaming time and problematic gaming use, particularly among individuals living alone, underscoring the importance of emotional loneliness in exacerbating IGD risk (Park et al., 2024). Furthermore, studies among Indian populations during the pandemic reported positive correlations between IGD and loneliness, with loneliness acting as a psychological stressor that may drive excessive gaming behaviors (Patel & Sharma, 2021). Collectively, these findings suggest that emotional loneliness contributes to the onset and maintenance of IGD by motivating individuals to seek emotional fulfillment through gaming, which may lead to problematic use and associated psychological distress.

Few studies have examined the relationship between social loneliness and Internet Gaming Disorder (IGD), revealing significant associations. Research among male university students found that social loneliness, alongside social anxiety, positively predicts gaming addiction, highlighting the role of social isolation in IGD development (Shah et al., 2024). A study of Chinese university students during the COVID-19 pandemic reported that social isolation was positively correlated with IGD, with self-control mediating this relationship, suggesting that socially isolated individuals may turn to gaming as a coping mechanism (Zhang et al., 2024).

Longitudinal evidence also links loneliness with online gaming addiction, emphasizing the need for interventions targeting social disconnection to reduce IGD risk (Wang et al., 2024). Additionally, research indicates that individuals with IGD often experience higher levels of loneliness and social isolation compared to the average gamer, with social isolation contributing to lower resilience and poorer quality of life (Ko et al., 2024). Another study highlighted that IGD is more prevalent among individuals with fewer close friends and greater social frustration, further supporting the connection between social loneliness and problematic gaming behaviors (Yilmaz & Demir, 2022). Collectively, these findings underscore that social loneliness is a significant factor in the onset and maintenance of IGD, often driving individuals to seek social fulfillment through excessive gaming.

In Malaysia, previous studies reported emotional and social loneliness across different age groups. Among university students, loneliness has been rising, with emotional loneliness linked to depression and exacerbated by psychosocial factors and the COVID-19 pandemic (Mir et al., 2023). Research on mid-aged and older adults in Malaysia found that loneliness is prevalent, with social connectedness and family relationships as protective factors against emotional and social loneliness (Teh et al., 2018; Malaysia Ageing and Retirement Survey, 2018–2019). Studies focusing on older adults in Johor reported that approximately 37% experience loneliness, with social loneliness affecting about 32.6% and emotional loneliness 39.9%, significantly impacting physical and mental health (MJMHS, 2024). Among Malaysian university students, loneliness, often intertwined with depression, has been identified as a significant predictor of suicidal behavior, highlighting the emotional loneliness dimension within this population (Norazizi et al., 2024). National surveys also indicate that about 16.2% of Malaysian adolescents report feeling lonely, with a smaller percentage lacking close friendships, reflecting emotional and social loneliness concerns (NHMS, 2022). Collectively, these findings illustrate that emotional and social loneliness are significant issues in Malaysia, affecting diverse populations and linked to mental health outcomes.

Boredom and Internet Gaming Disorder

Boredom is defined as "an unpleasant, transient affective state, in which the individual feels a pervasive lack of interest and difficulty, to concentrate on activities" (Fisher, 1993, p. 396). Iso-Ahola and Weissinger (1987) defined boredom as "a negative mood or state of mind, that reflects a mismatch between "optimal" experiences, and the experiences that are actually available to the individual" (p. 358). Lin, Lin, and Wu (2009) opined that boredom can be described as "a negative state of mind, which reflects an inner conflict, between expected optimal and perceived experiences" (p. 994). In other words, when an individual undergoes boredom, there is a mismatch between their need for excitement and the stimulation in their surroundings.

Leisure boredom has been associated with internet addiction (Chou et al., 2018; Wang, 2019), smartphone use (Barkley & Lepp, 2021; Kil et al., 2021; Leung, 2020), problematic Facebook use (Donati et al., 2021), and IGD (Li et al., 2021). Internet gaming activity, as a response to social restrictions, can lead to psychological distress (Higuchi et al., 2020), while the prolonged indulgence in internet gaming can result in boredom. Boredom, which is among the common triggers for excessive internet use, is significantly associated with internet addiction (Jiang et al., 2018) and psychological distress (Chao et al., 2020). Internet gaming allows young people to maintain their social life and provides them with the social space for maintaining friendships and coping with boredom (Bengtsson et al., 2021). Despite growing research, there remains a glaring dearth of information in Malaysia concerning the association

between leisure boredom and IGD. To date, studies have been conducted on the associations between loneliness, leisure boredom, and IGD, regarding Malaysian gamers. Therefore, the present study is therefore the first in this area.

Theoretical Framework of Internet Gaming Disorder

The theoretical framework posits that the COVID-19 pandemic exacerbated Internet Gaming Disorder (IGD) among Malaysian gamers through a dynamic interplay of elevated loneliness, leisure boredom, and environmental stressors. Grounded in social cognitive theory, lockdowns (Movement Control Orders) disrupted social routines, amplifying loneliness as individuals turned to multiplayer games (e.g., Mobile Legends) for virtual socialization, creating a bidirectional cycle where excessive gaming deepened social withdrawal. Simultaneously, restricted access to traditional leisure activities intensified boredom, driving escapism-focused gaming, particularly among adolescents and emerging adults (15–25 years) who lacked coping mechanisms or social support. Key moderators like impulsivity, male gender (due to cultural norms favoring competitive gaming), and pre-existing social anxiety accelerated IGD development, while neuropsychological factors (e.g., dysregulated dopamine responses) and game design elements (e.g., loot boxes and rank systems) reinforced addictive behaviors. This framework emphasizes that pandemic-specific stressors interact with individual vulnerabilities to fuel IGD, necessitating interventions targeting maladaptive gaming motives, regulatory measures against exploitative game mechanics, and community-based alternatives to structured leisure.

Methods

Research Design

This study employs a gaming population-based approach by specifically recruiting individuals who actively participate in gaming activities, rather than sampling from the general population. This targeted sampling strategy ensures the data collected are directly relevant to understanding gaming behaviors and potential issues, such as Internet Gaming Disorder (IGD) among Malaysian gamers during the COVID-19 pandemic. By focusing on gamers, the study excludes non-gamers who may not exhibit gaming-related experiences or risks, thereby enhancing the precision and relevance of the findings to the gaming community. Participants were defined as "gamers" if they reported playing video games (online or offline) for at least one hour per week on average. This criterion ensured that all participants had active gaming experience, allowing for a more accurate assessment of IGD prevalence and its correlates within this specific population.

Participants and Procedures

A total of 432 internet gamers participated in an online survey during the partial COVID-19 pandemic lockdown in Malaysia. The sample consisted of 256 males (59.3%) and 176 females (40.7%), with an average age of 21.06 years (SD = 2.90). Among the respondents, 73.1% had a university-level education, 81.0% were unemployed, 96.3% were married, 68.1% earned a monthly salary of less than RM3026 (approximately USD 730), and 59.7% lived in households with more than five people.

In March 2021, participants were recruited through advertisements on the Malaysian Gamers Community Facebook group, the PC Gamers Community Facebook group (utilizing targeted Facebook Ads to reach specific gamer demographics), Telegram groups (where study invitations were pinned for increased visibility), WhatsApp groups (encouraging members to share the study link directly with their gamer contacts), and Instagram (using relevant gaming hashtags to broaden the reach). To expand the sample further, members were actively encouraged to share the study within their networks by tagging gamer friends in comments, reposting announcements, and forwarding invitations across multiple platforms, effectively leveraging social media's viral sharing features. This convenience snowball sampling strategy was amplified by tapping into the interconnected nature of gaming communities, enabling the recruitment to grow organically beyond the initial groups and reach a wider, more diverse pool of participants. Participants were informed about the study's objectives and the methods of data analysis before receiving a link to the survey, which required approximately 10 to 15 minutes to complete. Participation was entirely voluntary, with strict assurances of confidentiality and anonymity provided to all participants. To qualify for the study, participants were required to meet the following criteria:

- Be online gamers aged between 18 and 20 years old.
- Have reliable internet access.
- Be proficient in reading and understanding the Malay language.
- Be Malaysian citizens.

Ethics Approval

The researchers followed a rigorous, internationally recognized framework to ensure data integrity and ethical compliance throughout the study. Before data collection, they adhered to COSMOS guidelines and applied strict eligibility criteria, focusing on Malaysian gamers aged 18–20 proficient in Malay to minimize selection bias and create a more uniform sample. The researchers implemented GDPR-inspired measures during data collection, including anonymized IDs, encrypted data storage, and real-time checks like mandatory fields and logical consistency filters to avoid incomplete or inaccurate responses. After data collection, variables were linked to validated psychometric tools (DJGLS for loneliness and LBS for boredom) to confirm construct validity. Data cleaning and analysis followed documented, reproducible procedures to ensure transparency and auditability. Ethical standards were maintained according to the Malaysian Code of Responsible Conduct in Research (MCRCR), Malaysian Guidelines for Good Clinical Practice, and the Personal Data Protection Act, with continuous monitoring to prevent coercion. The study received formal approval from the Research Ethics Committee of Universiti Kebangsaan Malaysia (UKM PPI/III/8/JEP-2020-793), affirming compliance with both national and international ethical guidelines.

Measures

Socio-Demographics. This section of the survey included questions about gender, age, marital status, education level, employment status, monthly income, number of children, and hours per day spent online gaming.

Loneliness. The short version of the De Jong Gierveld Loneliness Scale (DJGLS) was used to assess loneliness and consists of six items that measure two dimensions: emotional loneliness and social loneliness. Three items evaluate emotional loneliness: "I experience a general sense

of emptiness," "I miss having people around," and "I often feel rejected." The other three items assess social loneliness: "There are plenty of people I can rely on when I have problems," "There are many people I can trust completely," and "There are enough people I feel close to." Each item is rated on a five-point scale ranging from 1 (definitely not) to 5 (definitely yes), yielding total scores between 6 and 30, with higher scores indicating greater loneliness. The DJGLS demonstrated acceptable reliability and validity in previous research (e.g., Jaafar et al., 2020). In the present study, the scale showed satisfactory internal consistency with a Cronbach's alpha of .71.

Leisure Boredom. Leisure boredom was assessed using the 16-item unidimensional Leisure Boredom Scale (LBS). The items are rated on a five-point scale from 1 (strongly disagree) to 5 (strongly agree). Total scores range from 16 to 80, with higher scores indicating greater boredom. The researchers used the following items to evaluate leisure boredom: "For me, leisure time just drags on and on," "Leisure time is boring," and "I am excited about leisure time." Each item was rated on a five-point scale from 1 (strongly disagree) to 5 (strongly agree). In the present study, the Cronbach's alpha was .81. As there is no Malay version of the BLS, the researchers had to obtain permission from the original developers to translate the scale. In validating the Leisure Boredom Scale (LBS) for use in Malaysia, the researchers employed a rigorous back-translation and committee review process. Initially, the original scale developers gave their permission to translate the LBS into Malay. Two native Malay speakers, both highly proficient in English, independently translated the scale. Subsequently, two psychologists reviewed these translations to select the most accurate and culturally relevant renditions, ensuring the Malay version retained the original meaning and intent of the items in the LBS. This multi-step approach, guided by the methodology of Beaton et al., aimed to establish semantic equivalence between the original English scale and the Malay adaptation, strengthening the validity of the research findings.

Cultural and linguistic differences may influence the interpretation of the study's results, particularly regarding loneliness and leisure boredom among Malaysian gamers. For example, the country's collectivist culture may affect how loneliness is experienced and reported, potentially leading to the De Jong Gierveld Loneliness Scale (DJGLS) not fully capturing accurate results. Despite the back translation of the Leisure Boredom Scale (LBS), some differences in meaning could persist, impacting how participants interpret items. Furthermore, social desirability bias might lead to underreporting negative emotions or problematic gaming behaviors due to cultural norms. Socioeconomic factors, given the sample's high unemployment and low-income rates, could also contribute to loneliness and boredom, interacting with gaming habits uniquely. Additionally, religious values in Malaysia might influence attitudes toward leisure and gaming, potentially affecting survey responses.

Internet Gaming Disorder. The researchers utilized the nine-item Internet Gaming Disorder Scale–Short Form (IGDS9-SF) to assess Internet Gaming Disorder (IGD) based on the nine diagnostic criteria outlined in the DSM-5 (American Psychiatric Association, 2013). Each item, such as "Do you feel more irritability, anxiety, or sadness when you try to reduce or stop your gaming activity?" and "Do you feel the need to spend increasing amounts of time gaming to achieve satisfaction or pleasure?", is rated on a five-point Likert scale ranging from 1 (never) to 5 (very often). Total scores range from 9 to 45, with scores between 32 and 45 (indicating frequent or very frequent endorsement of symptoms) operationally defining the presence of IGD. The IGDS9-SF has demonstrated strong psychometric properties, including good internal consistency, content validity, concurrent validity, and discriminant validity across diverse populations and languages. In the present study, the scale showed good reliability with a Cronbach's alpha of .82, consistent with previous research confirming its unidimensional structure and robust criterion validity as a concise and effective screening tool for IGD.

Determining the Cut-Off Point for the Scales

The researchers conducted the analysis using continuous scale scores for Internet Gaming Disorder (IGD), followed by an examination of dichotomous indices to compare categorical and continuous measures. To facilitate this, it was necessary to establish optimal cut-off points for emotional loneliness, social loneliness, and leisure boredom. Since the study lacked a "gold standard" reference measure (such as clinical interviews) to assess the sensitivity and specificity of the scales, median scores were employed as pragmatic cut-off estimates, consistent with Mills' (1983) approach. This method also allows for the calculation of 95% Confidence Intervals (CI) around the cut-offs. Based on the median values, cut-off points were set at 5 for emotional loneliness, 9 for social loneliness, and 42 for leisure boredom. For household monthly income, the mean value was used as the threshold, with individuals earning less than RM3027 classified as being in the low-income group.

Statistical Analysis

Data analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 26.0. Descriptive statistics were examined for all the study variables. The initial analysis was checked for normality. The researchers used the Chi-square and Fisher's tests for the dichotomous IGD outcome comparison, binary logistic regression for testing several factors relating to the dichotomous IGD outcome, and Cronbach's alpha coefficient for testing the internal consistency of the psychometric scales.

Results

Prevalence of Internet Gaming Disorder, Loneliness, and Leisure Boredom

Table 1 displays the prevalence rates for IGD, loneliness, leisure boredom, and the Chi-square test with different characteristics. According to the results, 82 participants were classified as having IGD (19.0%; ≥ 32 scores on IGD). No significant associations were found between IGD and gender (χ^2 = .12, df = 1, p > .05), age (χ^2 = .45, df = 1, p > .05), educational level (χ^2 = 1.90, df = 1, p > .05), employment (χ^2 = .03, df = 1, p > .05), marital status (χ^2 = .45, df = 1, p > .05), monthly household income (χ^2 = .00, df = 1, p > .05), number of household members (χ^2 = .55, df = 1, p > .05), or leisure boredom (χ^2 = 1.57, df = 1, p > .05). However, significant associations were found between IGD and emotional loneliness (χ^2 = 23.07, df = 1, p < .001), social loneliness (χ^2 = 4.80, df = 1, p < .05), and daily time spent online gaming (χ^2 = 11.89, df = 1, p < .001). Table 1 also shows that most gamers reported experiencing emotional loneliness (59.5%), social loneliness (58.8%), and leisure boredom (56.0%).

All factors were introduced into a binary logistic regression model, with IGD as an outcome variable (Table 2). The likelihood ratio Chi-square test indicated that the full model was significant ($\chi^2_{(11)}$ = 41.18, p < .001). The Hosmer–Lemeshow Chi-square test was insignificant and indicative of a well-fitting model ($\chi^2_{(8)}$ = 3.78, p > .05). Emotional loneliness was added into the model (odds ratio = 4.15) with the largest odds ratio, followed by daily time spent online gaming (odds ratio = 2.30). The model showed 81% goodness of fit. Social loneliness and leisure boredom, as well as other socio-demographics (i.e., gender, age, educational level, employment, marital status, monthly household income, and household number), were not significant.

Table 1. The Prevalence of IGD, Loneliness, Leisure Boredom, and the Chi-Square Test With Different Characteristics.

Variables	Cut-off	Total = 432 n (%)	IGD; n (%)		χ^2, df	*p*-value
			Yes	No		
Gender	1/0				.12, 1	>.05
Male		256 (59.3)	50 (11.6)	206 (47.7)		
Female		176 (40.7)	32 (7.4)	144 (33.3)		
Age	1/0				.45, 1	>.05
≥ 20 years old		272 (63.0)	49 (11.3)	223 (51.6)		
≤ 19 years old		160 (37.0)	33 (7.6)	127 (29.4)		
Educational level	1/0				.90, 1	>.05
University		316 (73.1)	55 (12.7)	261 (60.4)		
Non-university		116 (26.9)	27 (6.3)	89 (20.6)		
Employment	1/0				.03, 1	>.05
Yes		82 (19.0)	15 (3.5)	67 (15.5)		
No		350 (81.0)	67 (15.5)	283(65.5)		
Marital status	1/0				.45, 1	>.05
Married		16 (3.7)	2 (.5)	14 (3.2)		
Not married		416 (96.3)	80 (18.5)	336 (77.8)		
Monthly household income (RM)	1/0				.00, 1	>.05
≥ 3028		138 (31.9)	26 (6.0)	112 (25.9)		
≤ 3027		294 (68.1)	56 (13.0)	238 (55.1)		
Number of household members	1/0				.55, 1	>.05
≥ 5		258 (59.7)	46 (10.6)	212 (49.1)		
≤ 4		174 (40.3)	36 (8.3)	138 (31.9)		
Emotional loneliness	1/0				23.07, 1	<.001
Yes		257 (59.5)	68 (15.7)	189 (43.8)		
No		175 (40.5)	14 (3.2)	161 (37.4)		
Social loneliness	1/0				4.80, 1	<.05
Yes		254 (58.8)	57 (13.2)	197 (45.6)		
No		178 (41.2)	25 (5.8)	153 (35.4)		
Leisure boredom	1/0				1.57, 1	>.05
Yes		242 (56.0)	51 (11.8)	191 (44.2)		
No		190 (44.0)	31 (7.2)	159 (36.8)		
Time spent online gaming a day	1/0				11.89, 1	<.001
≥ 5 hours		195 (45.1)	51 (11.8)	144 (33.3)		
≤ 4 hours		237 (54.9)	31 (7.2)	206 (47.7)		

Table 2. Logistic Regression Analysis of Factors Associated With IGD.

Variables	Unadjusted model			Adjusted model		
	Odds ratio	95% confidence interval (CI)	*p*-value	Odds ratio	95% confidence interval (CI)	*p*-value
Gender						
Male	1.09	.668–1.787	.725	1.16	.678–1.992	>.05
Female	Reference			Reference		
Age						
≥ 20	.85	.517–1.383	.504	.89	.483–1.622	>.05
≤ 19	Reference			Reference		
Educational levels						
University	.70	.413–1.168	.169	.75	.411–1.382	>.05
Non-university	Reference			Reference		
Employment status						
Yes	.95	.509–1.758	.860	.99	.482–2.060	>.05
No	Reference			Reference		
Marital status						
Married	.60	.134–2.693	.505	1.07	.195–5.903	>.05
Not married	Reference			Reference		
Monthly household income (RM)						
≥ 3028	.99	.589–1.654	.959	1.03	.584–1.812	>.05
≤ 3027	Reference			Reference		
Number of household members						
≥ 5	.83	.512–1.352	.458	.77	.459–1.305	>.05
≤ 4	Reference			Reference		
Emotional loneliness						
Yes	4.14	2.243–7.633	.000	4.15	2.160–7.971	<.001
No	Reference			Reference		
Social loneliness						
Yes	1.77	1.058–2.965	.030	1.52	.864–2.669	>.05
No	Reference			Reference		
Leisure boredom						
Yes	1.37	.836–2.243	.212	.86	.495–1.495	>.05
No	Reference			Reference		
Time spent on online gaming a day						
≥ 5 hours	2.35	1.435–3.859	.001	2.30	1.357–3.890	<.001
≤ 4 hours	Reference			Reference		

In terms of goodness of fit, 81% of subjects were correctly classified. The best model was provided by emotional loneliness and time spent on online gaming.

In this study, significant results (e.g., $p < 0.05$) suggest that relationships between variables (e.g., loneliness, leisure boredom, and IGD) are not random. However, statistical significance alone does not reflect the real-world relevance of these findings. A statistically significant link between loneliness (DJGLS) and IGD (IGDS9-SF) suggests that interventions targeting social isolation may reduce gaming disorder risks. However, the effect size determines whether this relationship warrants clinical attention. For instance, a large effect size would imply urgency in addressing loneliness among gamers. If leisure boredom (LBS) has a small but significant effect on IGD, the practical implications depend on context. In education or workplace settings, even minor reductions in boredom might enhance productivity, but in clinical settings, larger effects may be needed to justify resource allocation. This study's Malaysian sample may limit generalizability due to factors such as its collectivist culture and economic constraints. While statistical significance validates the findings internally, practical implications must consider cultural nuances. For example, loneliness may manifest differently in collectivist societies than in individualistic ones.

Discussion

During the COVID-19 pandemic, a study of Malaysian gamers revealed a 19% prevalence rate of IGD. Emotional loneliness emerged as a significant risk factor, while social loneliness and leisure boredom did not show significant associations. A daily gaming duration exceeding five hours was strongly linked to IGD.

The prevalence of IGD among Malaysian gamers is slightly higher compared to the 13% reported by Yang et al. (2020) in their study of Chinese adolescents in Hong Kong. However, the cut-off was arguably low. The study did not find a difference in IGD scores between males and females, which is inconsistent with the findings from previous studies (e.g., Su et al., 2020). Online gaming is viewed as a predominantly male leisure activity (Bryce & Rutter, 2003), and it is considered to be more socially acceptable for males than females (Winn & Heeter, 2009). However, this view is outdated, given the growing number of females indulging in online gaming (see Lopez-Fernandez, Williams & Kuss, 2019).

In contrast with previous studies (such as those conducted by Liao et al. (2020) and Siste et al. (2021)), the present study did not find age, monthly household income, education level, employment status, marital status, or number of household members as risk factors of IGD. This inconsistency in findings could be due to the different instruments used or the different cultural setting of the study (Liao et al., 2020). It could also be the change in circumstances (i.e., the unprecedented pandemic situation), which contributed to this inconsistency in findings.

The odds ratio indicated that time spent online gaming increased the likelihood of IGD by 2.3 times. This coincides with previous studies conducted by Kim et al. (2016) and Liao et al. (2020), which indicated that excessive time spent on online games increased the likelihood of IGD. In Malaysia, this result may be associated with the implementation of the Movement Control Order (MCO) during the pandemic, which limited the number of working staff at all government and private agencies, as well as non-governmental organizations, to 40%, with the remaining employees working from home. For schoolchildren and university students, online learning involved using online meeting platforms (e.g., Zoom, Google Meet, Microsoft Teams, etc.). The MCO, which lasted more than three months for some, caused many workers to lose their jobs. This left many stressed individuals with lots free leisure time, and many resorted to online games for relief. As for those working from home, the temptation to indulge in online gaming to reduce emotional loneliness may have also proved too great to resist (Amin et al., 2020).

Regarding the association of emotional loneliness and social loneliness with IGD, the findings showed that only emotional loneliness was significantly associated with IGD. This finding concurs with previous studies (Chen & Leung, 2016; Martončik & Lokša, 2016; T'ng et al., 2020; Wang et al., 2019; Zhou & Leung, 2012). The odds ratio indicated that emotional loneliness increased the likelihood of IGD by 4.15 times. Emotional loneliness stems from the lack of social interactions, particularly in the form of face-to-face activities (Chen & Leung, 2016). Participation in online games can, for some, effectively alleviate emotional loneliness (T'ng et al., 2020).

The relationship between emotional loneliness and time spent online gaming aligns with the theoretical framework of IGD, where environmental stressors can motivate excessive gaming, potentially leading to negative emotional states (Brand et al., 2019, 2016). During the pandemic, social restrictions may have led individuals to engage in online gaming to manage emotional loneliness. This aligns with previous research indicating that social isolation can lead to negative psychological consequences, including mental stress, lack of concentration, insomnia, and anger (Al-Kandari & Sejari, 2021).

Surprisingly, social loneliness was not associated with IGD. Most players meet other players in the real world, and some prefer to play only with individuals they know (Domahidi et al., 2014; Frederick & Zhang, 2021). Online games allow individuals to meet others with similar interests and experiences, with whom discussions about online games can be entertaining (Martončik & Lokša, 2016). Gamers are perceived to be quite open to welcoming new individuals into their gaming community, and this serves to extend their social network further. One of the most notable aspects of online gaming, particularly during the pandemic, is the fact that players can continue socializing despite being physically isolated for extended periods (Zhu, 2021).

In contrast to previous studies, the findings from the present one showed that leisure boredom was not associated with IGD. This may be due to individuals using online gaming as an avoidance coping strategy. When gamers actively participate in online gaming and feel contented with the feeling this activity provides, their psychosocial needs (such as support and attention) are fulfilled in the virtual world. Future studies in this area should therefore examine boredom and boredom avoidance in relation to psychosocial needs as a coping strategy during the pandemic.

Several limitations should be considered when interpreting the results. First, the cross-sectional study design precludes any causal inferences between emotional loneliness and IGD. It is possible that IGD exacerbates feelings of emotional loneliness or that other unmeasured variables contribute to both. Second, the reliance on self-report measures introduces the potential for biases such as social desirability bias and recall bias. Participants may have under-reported their gaming hours or symptoms of IGD to present themselves in a more favorable light. Third, the sample was recruited online and may not be representative of all Malaysian gamers. Specifically, it may be biased toward individuals who are more active online and have greater access to technology, limiting the generalizability of the findings.

Future research should address these limitations by employing longitudinal designs to examine the temporal relationships between loneliness, boredom, and IGD. Additionally, studies could benefit from using data collection methods, such as incorporating behavioral data (e.g., actual gaming time tracked through gaming platforms) and qualitative interviews to provide a more comprehensive understanding of the lived experiences of individuals with IGD. Further research is also needed to explore potential moderating and mediating factors, such as coping styles, social support, and personality traits, that may explain the complex relationships between loneliness, boredom, and IGD. Finally, future studies should aim to recruit more representative samples of Malaysian gamers to enhance the generalizability of the findings. Investigating

specific game genres and their potential differential associations with IGD could also provide valuable insights for targeted prevention and intervention efforts.

Conclusion

This study provides critical insights into the prevalence and correlates of Internet Gaming Disorder (IGD) among Malaysian gamers during the COVID-19 pandemic. The findings reveal a notable 19% prevalence rate of IGD, underscoring that nearly one in five Malaysian gamers experienced problematic gaming behaviors during this period. A key finding is the significant association between emotional loneliness and IGD, suggesting that gamers may turn to online gaming as a maladaptive coping mechanism to fulfill unmet emotional needs. Contrary to expectations, social loneliness and leisure boredom did not show significant associations with IGD in this study. Furthermore, spending more than five hours daily gaming was identified as a significant risk factor for IGD.

These findings have several practical implications for addressing IGD, particularly in the wake of the pandemic. Interventions should prioritize addressing emotional loneliness through targeted support systems and mental health resources. Strategies that foster real-life emotional connections and provide alternative coping mechanisms are crucial. Promoting responsible gaming habits, including setting time limits and encouraging engagement in diverse leisure activities, can also help mitigate the risks associated with excessive gaming. The study emphasizes the importance of monitoring gaming duration, especially among vulnerable individuals, and developing public health campaigns to raise awareness about IGD and its potential impact on mental health. Focusing on emotional well-being and responsible gaming practices can help effectively address and prevent IGD among Malaysian gamers.

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Compliance With Ethical Standards

This study was conducted in strict adherence to ethical guidelines for research involving human participants. Ethical approval was obtained from the Research Ethics Committee of Universiti Kebangsaan Malaysia (approval number withheld for anonymity), ensuring alignment with the Malaysian Code of Responsible Conduct in Research and international standards such as the Belmont Report. Informed consent was secured from all participants prior to their involvement, with clear communication about the study's objectives, voluntary participation, and their right to withdraw at any stage. Confidentiality and anonymity were maintained through anonymized identifiers and secure data storage protocols. The research design incorporated safeguards to minimize risks, including bias mitigation strategies and transparent disclosure of the RM50 incentive (provided only upon full survey completion). No conflicts of interest were reported by the authors.

Ethical Approval

All procedures performed during the present study were in accordance with the ethical standards of the University's Research Ethics Board, as well as with the 1975 Helsinki Declaration.

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