ORIGINAL ARTICLE

Exploring Triggers of Mobile Gaming Addiction in Economically Challenged Youth in Malaysia: A Cross-sectional Study

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ABSTRACT

Introduction: The recognition of mobile gaming addiction as an emerging phenomenon has led to an awareness of its detrimental effects on overall health functioning. Existing literature indicates a prevalence of problematic behaviours, particularly among adolescents, but there remains a scarcity of studies in this area, necessitating further investigation. Aim: This study aimed to ascertain the prevalence of mobile gaming addiction and identify its associated factors among low-income adolescents. **Materials and methods:** A cross-sectional study was conducted in March and April 2023 using a questionnaire administered to adolescents aged 13 to 17 years old within a selected low-income housing program in Kuala Lumpur. Statistical analyses including Chi-square tests and multiple logistic regression were employed to determine the independent variables linked to mobile gaming addiction. **Results:** Out of 288 respondents, 8.7% (25) were classified as addicted. Significant associations were established with age, gender, relationships with friends, parental monitoring, and game genre. Notably, age (AOR = 18.728, 95% CI = 6.113 – 57.372), friends relationship (AOR = 4.619, 95% CI = 1.127 – 17.530) and parental monitoring (AOR = 0.182, 95% CI = 0.058 – 0.566) emerged as predictors of mobile gaming addiction. **Conclusion:** This study identified a significant prevalence of mobile gaming addiction among low-income adolescents, particularly those aged 16 to 17 years, with limited parental monitoring and large social networks. These findings highlight the need for targeted interventions focusing on age-specific strategies, peer influence, and parental involvement to address this issue.
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INTRODUCTION

In 2019, the WHO's recognition of gaming disorder as a mental health condition highlighted the addictive nature of gaming, including mobile gaming[1]. While the ICD-11 acknowledges gaming disorders across platforms, the DSM-V doesn't explicitly recognise Mobile Gaming Addiction (MGA), yet both acknowledge potential negative impacts [2,3].

MGA's prominence among adolescents is underscored by varying prevalence rates reported worldwide, with rates escalating in countries such as the Netherlands (4.0%), Pakistan (12.5%), and India (31.7%), as indicated by Lemmens et al.(2015), Zaman et al.(2002), and Surya et al.(2024)[4,5,6]. Notably, Southeast Asia's meta-analysis reported a pooled prevalence of 10.1%, while Malaysia, specifically, detected problematic gamers among university students at 4.5%, as highlighted by Chia et al. (2020)[7] and Ting & Essau (2021)[8].

During adolescence, ongoing brain maturation leads to heightened vulnerability to addiction, and low-income adolescents face unique challenges that may increase susceptibility to MGA[9,10,11]. Low-income adolescents may be more prone to gaming addiction due to gaming serving as an escape from poverty-related stress, limited access to other recreational activities, reduced parental supervision, and the affordability of free online or mobile games with in-app purchases[12,13].

Widespread availability of smartphones and mobile games lead to adverse consequences on academic performance, mental health, and overall well-being[14,15] . Compulsive gaming has adverse outcomes, affecting mental health and physical well-being[16,17], and can lead to financial issues and decreased productivity[18]. Despite research on gaming addiction, more attention is needed on mobile gaming, particularly within low-income populations in Malaysia[7,8]. Unique challenges faced by low-income adolescents, who use gaming as an escape, amplify their vulnerability to MGA[12,13].

Factors contributing to MGA include gender, gaming frequency, and accessibility[19,20,21]. Notably, limited literature focuses on low-income adolescents and MGA factors. Despite widespread mobile game availability, existing research inadequately addresses mobile gaming addiction among low-income adolescents, leading to a need for further research[16,17].

Hence, this study aimed to explore the prevalence and predictors of MGA among adolescents aged thirteen to seventeen years old from low-income backgrounds in Malaysia.

MATERIALS AND METHODS

Study Design

This cross-sectional study was undertaken among Malaysian secondary school-aged adolescents living in a selected low-income housing program in Kuala Lumpur, Malaysia. Kuala Lumpur is the capital of Malaysia and densely populated. The high-density population produces negative social attitudes and undesirable behaviours such as addiction[22]. Physical and socio-psychological problems can be found in low-cost housing areas[23], where low-cost housing residents tend to cope with their given environmental setting for many reasons[24].The number of people residing in one of these areas was estimated to be 8,000, where as the secondary school-aged adolescents were estimated at 1000 which was conveniently feasible to conduct this study with the required sample size of 288[25] with ensuring a 95% of confidence interval and a 5% margin of error. A set of pen-and-paper questionnaire study was conducted from March to April 2023 among respondents chosen using simple random sampling. This process involved using a random number generator to choose 288 respondents from a sampling frame of adolescents identified as mobile gamers from low-income households, ensuring unbiased representation.

Eligibility

Adolescents were included in this study based on whether or not they were mobile gamers and from a low-income background. These were determined by the adolescents' answer to the first section of the questionnaires: "Do you play mobile games"; and "Are your parents' household income below RM9150?". Those who answered "Yes" to both of these questions were included in this study. Eligibility was also restricted to only secondary school-aged adolescents. Based on the Department of Statistics Malaysia (2022)[26], the household income group of low-income among KL citizens was RM9150 and below.

Variables

The variables of this study were divided into dependent and independent variables. Mobile gaming addiction status was the outcome of the study whereas the individual's factors, parents' factors, gaming habit and mobile gaming characteristics were the independent variables. Mobile Gaming Addiction Scale (MGAS) questions were adapted from Lemmens et al. (2009)[27] and it consist of seven of DSM-5 criteria for addiction: salience, mood modifications, tolerance, withdrawal, conflict, relapse and problems. Furthermore, each statement's responses were rated on a 5-point Likert scale ranging from 1 (Never) to 5 (Always). The Addiction Index (Fig. 1) from the MGAS adopted from Wan Yaacob et al. (2021) will be calculated to obtain the Score Ratings (Table I) which will decide whether the respondents are addicted or non-addicted mobile gamers [28]. As for other questionnaires were self-structured which were evaluated by two experts in the field. Cohen's Kappa test was used to assess the reliability of the study instrument's categorical data type of questions. The result was above 0.70 for all four factors, with individual factor at 0.938, parental factor at 0.849, gaming habits at 0.921 and mobile game characteristics at 0.893, respectively. The Cronbach alpha for MGAS with 7-items was 0.81.

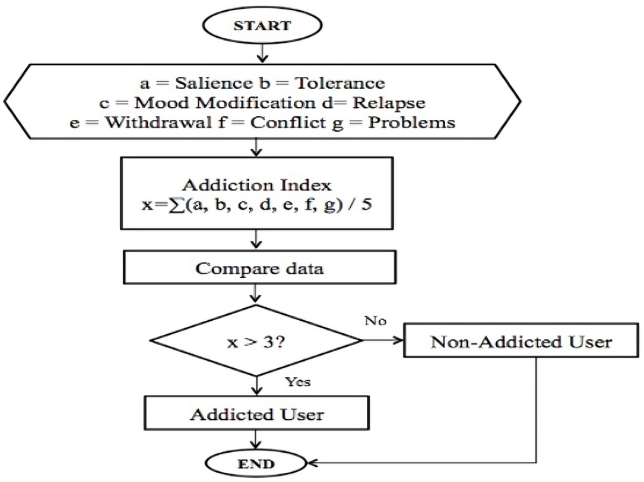

Fig. 1: Algorithm used to Calculate Addiction Index

Table I: The Score Rating for Mobile Game Addiction Scale

Score	1	2	3	4	5	6	7
Descriptions	Non-addicted				Addicted		

Statistical Analysis

The collected data were analysed using IBM Statistical Package for Social Sciences (SPSS) version 28.0. Descriptive statistics on MGA, individual's factors (age, gender, device ownership, age exposure of the device, and friends' relationship), parents' factors (parents' educational level, household income, family relationship, and parental monitoring), gaming habits (duration and frequency of gaming) and mobile game characteristics (gaming platform, mode of gaming, category of games) were analysed.

The frequencies of categorical variables were compared between outcome categories using Chi-squared tests for all variables, except when Fisher's exact test was used (due an expected count of <5 in 25% or more cells).

The relationship between the dependent and independent variables was then examined by chi-squared test for categorical independent variables. The dependent variable was the addicted mobile gamers. The independent variables were individual's factors (gender, device ownership, and friends' relationship), parents' factors (parents' educational level, household income, family relationship, and parental monitoring), gaming habits (frequency of gaming), and mobile game characteristics (gaming platform, mode of gaming, category of games).

Next, multiple logistic regression was used to determine the predictors of MGA. Results expressed as adjusted Odds Ratio, with a significance level, were set at 0.05 ($p < 0.05$), and the association was considered significant if the 95% confidence interval (CI) did not cross one. Diagnostic tests were conducted to measure goodness of fit and assessed influential observations. Goodness of fit was assessed using the Hosmer–Lemeshow (H–L) test for logistic models.

Ethics Approval

This study was approved by the Ethics Committee for Research Involving Human Subjects, Universiti Putra Malaysia, in March 2023 (JKEUPM-2023-172). A participant information sheet on the aim and nature of the study was provided, and written informed consents were obtained from each adolescent and parent who agreed to participate.

RESULTS

The total number of respondents randomly selected was 288. All of them completed the questionnaire, with 100.0% response rate. Demographic characteristics are shown in Table 1. As only mobile gamers with low-income background were eligible to be respondents in this study, certain demographic groups such as boys were more dominantly represented than girls. Approximately 8.7% of the studied population were identified as mobile game addicts. The results of chi-square and multiple logistic regression analysis are shown in Table II and Table III, respectively. Goodness-of-fit tests showed the model was a good fit ($\chi^2 = 2.737$, $P = 0.841$) and there were no influential observations.

Table II: Demographic characteristics of participants (N=288)

Variable	n	%
Age (years)		
13- 15	222	77.1
16-17	66	22.9

CONTINUE

Table II: Demographic characteristics of participants (N=288) (CONT.)

Variable	n	%
Gender		
Boys	167	58.0
Girls	121	42.0
Race		
Malay	263	91.3
Others	25	8.7
Ownership of Mobile Device		
Yes	288	100.0
No	0	0.0
Age Exposure to Mobile Device (years)		
5 to 9	93	32.3
10 to 12	187	65.0
>12	8	2.7
Friends Relationship		
<6 close friends	120	41.7
6 and more close friends	168	58.3

MGA status and associated factors

Demographic Factor

Significant associations with MGA were observed for age ($\chi^2 = 26.157$, df = 1, $p < 0.001$), gender ($\chi^2 = 19.836$, df = 1, $p < 0.001$), and friends relationship ($\chi^2 = 9.913$, df = 1, $p = 0.002$). In the logistic regression analysis, age emerged as the most prominent predictor of MGA (AOR = 18.728, 95% CI = 6.112 - 57.372). Adolescents aged 16 to 17 years old exhibited a 19-fold higher likelihood of developing addiction compared to their 13 to 15-year-old counterparts. Furthermore, the presence of six or more close friends significantly elevated the probability of addiction, as indicated by the friends' relationship score (AOR = 4.619, 95% CI = 1.127 - 17.532).

Parent Factor

The results of the study indicated a significant association between parental monitoring and MGA ($\chi^2 = 7.042$, df = 1, $p = 0.008$). Specifically, individuals who reported a lack of parental monitoring were shown to be less likely to develop MGA (AOR = 0.182, 95% CI = 0.058 – 0.566).

Gaming Habit

Significant associations were observed between mobile game addiction and both gaming duration ($\chi^2 = 31.905$, df = 1, $p < 0.001$) and gaming frequency ($\chi^2 = 37.250$, df = 1, $p < 0.001$).

Mobile Game Characteristics

The genre of game within the gaming category was shown to be significantly associated with MGA ($\chi^2 = 5.402$, df = 1, $p = 0.020$).

Table III: Associated Factors with Mobile Game Addiction (N=288)

Variables	Addiction Category		χ^2	d*f*	*p*-value
	Non-Addicted n (%)	Addicted n (%)			
Demographic Factor					
Age (years)					
13 to 15	213 (95.9)	9 (4.1)	26.157	1	<0.001**
16 to 17	50 (75.8)	16 (24.2)			
Gender					
Boy	142 (85.0)	25 (15.0)	19.836	1	<0.001**
Girl	121 (100.0)	0 (0.0)			
Race					
Malay	240 (91.3)	23 (8.7)			
Others	23 (92.0)	2 (8.0)	-	-	0.628[a]
First Age Exposure					
9 and below	85 (91.4)	8 (8.6)	0.001	1	0.974
10 and above	178 (91.3)	17 (8.7)			
Ownership Mobile Device					
Yes	263(91.3)	25 (8.7)	-	-	-
No	0 (0.0)	0 (0.0)			
Friends Relationship					
<6 close friends	117 (97.5)	3 (2.5)	9.913	1	0.002**
6 and more close friends	146 (86.9)	22 (13.1)			
Parental Factor					
Mother Education Level					
Secondary and lower	224 (91.1)	22 (8.9)	-	-	0.490[a]
Tertiary	39 (92.9)	3 (7.1)			
Father Education Level					
Secondary and lower	160 (90.4)	17 (9.6)	0.495	1	0.482
Tertiary	103 (92.8)	8 (7.2)			
Monthly Household Income					
<RM5150	172 (92.0)	15 (8.0)	0.292	1	0.662
RM5150– RM9149	91 (90.1)	10 (9.9)			
Family Relationship					
Good Relationship	263 (91.3)	25 (8.7)	-	-	-
In Conflict	0 (0.0)	0 (0.0)			
Parental Monitoring					
Yes	97 (85.8)	16 (14.2)	7.042	1	0.008**
No	166 (94.9)	(5.1)			
Gaming Habit					
Duration of Gaming					
Less than 3 hours	155 (100.0)	0 (0.0)	31.905	1	<0.001***
More than 3 hours	108 (81.2)	25 (18.8)			
Frequency of Gaming					
1 to 5 days a week	166 (100.0)	0 (0.0)	37.250	1	<0.001***
6 to 7 days a week	97 (79.5)	25 (20.5)			
Mobile Game Characteristics					
Gaming Platform					
Mobile Phone	251 (90.9)	25 (9.1)	-	-	0.608[a]
Tablet/iPad	12 (100.0)	0 (0.0)			
Mode of Gaming					
Online	255 (91.1)	25 (8.9)	-	-	0.479[a]
Offline	8 (100.0)	0 (0.0)			
Category Of Games					
i.Game Player					
Solo/Single	32 (94.1)	2 (5.9)	-	-	0.750[a]
Multiplayer	231 (90.9)	23 (9.1)			
ii.Game Genre					
Action-Fighting (Role-Play)	199 (89.2)	24 (10.8)	5.402	1	0. 020*
Others	64 (98.5)	1 (1.5)			

***Significant at p-value <0.001; **Significant at p-value <0.001; *Significant at p-value <0.05; [a] Fisher's Exact Test

Table IV: Multiple Logistic Regression Model with Outcome: Mobile Game Addiction

Variables	AOR	95% CI	p-value
Age (years)			
13-15	1.00 (Reference)		
16-17	18.728	6.113 - 57.372	<0.001*
Friends Relationship			
Less than 6	1.00 (Reference)		
6 and above close friends	4.619	1.127 - 17.530	0.025
Parental Monitoring			
Yes	1.00 (Reference)		
No	0.182	0.058-0.566	0.003*
Category of Games: Genre of Game			
Action-Fighting (Role-Play)	1.00 (Reference)		
Others	8.416	0.991-71.491	0.051

*Significant p-value < 0.005, AOR = Adjusted odd ratio, CI = Confidence Interval

DISCUSSION

This study used logistic regression analysis to identify MGA predictors. Adolescents aged 16 to 17 years old, those with over six close friends, and those with limited parental monitoring had a higher MGA risk, explaining 37.6% of its variance.

The study's findings on age as a predictor aligned with existing research. Wittek et al. (2015)[29] and Hyun et al. (2015)[30] similarly found that age correlates with the prevalence of gaming addiction among teenagers, suggesting age as a predictive factor. This susceptibility of adolescents to addictive behaviours compared to adults may be attributed to neurodevelopmental changes[31]. Adolescents often experience increased independence during their developmental phase, diminishing parental control over their leisure activities and social interactions[32]. The influence of online gaming communication on adolescent development is of particular significance.

Recent research by Odinka et al. (2023)[33] highlights the role of age in online addiction. The study reported an 8.1% addiction rate among adolescents aged 13-15 and a significantly higher 30.9% prevalence among those aged 16-18. This age-related increase in addiction rates may be attributed to factors such as cognitive immaturity, underdeveloped executive functioning, and self-regulation difficulties[34]. Thus, exploring these developmental dynamics provides valuable insights into the varying levels of MGA across different age groups.

This research emphasized the role of parental monitoring as a potential risk factor in mobile game addiction. Past studies[35 - 37] suggested that excessive parental supervision can increase the likelihood of gaming addiction by limiting children's autonomy. Moreover, recent research on psychological parental monitoring supported the idea that excessive parental supervision is a risk factor for adolescent online addiction[38]. This study found a positive link between psychological parental monitoring and technology addiction behaviours in adolescents, with shyness acting as a mediator in this relationship. It is essential to use behavioural control judiciously to avoid overcontrolling and causing stress in adolescents[39].

The research also emphasizes how parents can influence adolescents' internet addiction through control measures. There is a higher incidence of online addiction among adolescents reporting maternal authoritarian parenting and paternal neglectful parenting. Interestingly, the absence of control and perceived low paternal affection appeared to be protective factors against substance use in young males[40 - 44]. Future investigations should explore different parental control patterns to comprehensively understand their impact on adolescent behaviours.

This study identified that having over six friends as a predictor of MGA, aligning with Gunuc's (2016)[45] findings. Furthermore, a proportion of frequent gamers perceive video games as a means to cultivate social connections, with 55 percent indicating that gaming helps maintain friendships and 46 percent mentioning its contribution to family bonding[46]. This underscores the potential of gaming to enrich social relationships, especially among gamers who value virtual social interactions.

Interestingly, students with a greater number of close friends exhibited a higher susceptibility to gaming addiction compared to those with fewer connections, confirming our expectations[47]. This suggests the possibility of peer influence playing a role, as adolescents addicted to gaming may spend more time online with peers[48]. As adolescents' desire to fit in with their peers makes them highly receptive to peer influences. While previous researches extensively recognised the significance of peer interactions in various aspects of adolescent behaviour, such as substance use and antisocial conduct, there has been limited exploration of peer influence on gaming practices[49-50]. This accentuates the need for future research to delve into the intricate dynamics of peer influence during adolescence, particularly concerning gaming behaviour and addiction. In summary, friendship nature and quality significantly affect gaming addiction likelihood.

Strengths & Limitations

This study had a 100% response rate, which increased its credibility and provided useful insights on the prevalence of MGA among adolescents in low-income secondary schools. The implementation of the adapted 7-item Mobile Game Addiction Scale (MGAS) revealed its practicability, usability, and solid reliability and validity, facilitating both researchers' work and

participant involvement. The use of a randomly selected sample, along with a calculated sample size, further strengthens the study's methodology. It is worth noting that research of this kind is scarce in Malaysia, particularly in low-income urban areas, making this study a crucial step in characterising this demographic and promoting awareness of preventive measures to combat mobile gaming addiction.

However, it is important to acknowledge certain constraints that limit the broader applicability of our findings. The study's focus was confined to a specific locale in Kuala Lumpur. Consequently, the outcomes may not be fully representative of secondary school-aged adolescents across the entire region. Additionally, our sample composition was restricted to adolescents aged between 13 and 17, limiting the generalisability of our results. The cross-sectional design employed in the study, while informative, restricts our ability to establish causal relationships, as it simultaneously assessed exposure and outcome variables. Furthermore, the reliance on self-administered questionnaires introduces the potential for recall bias, where participants may respond in a manner influenced by cultural and socially accepted norms rather than offering precise reflections of their behaviours.

Implication to Practice

This study highlighted the need for targeted interventions, especially among older adolescents. These interventions should encompass multifaceted strategies involving individuals, families, and communities, with a specific focus on enhancing parental monitoring and identifying adolescents with extensive social networks. Those identified as addicted should be referred to the nearest health clinic.

Efforts to prevent mobile gaming addiction should involve stakeholders from various domains, including the gaming industry, clinicians, researchers, policymakers, the public, gamers, families, and game developers. Proposed interventions should promote healthy gaming habits, emphasize school and quality parental monitoring, and encourage self-regulation in gaming through open dialogues between gamers and their families.

Close collaboration with the gaming industry is essential. Game developers can design features promoting self-regulation, such as on-screen time tracking and rewards for shorter gaming sessions. Gamers, their families, and friends can also contribute by selecting games that encourage team coordination and setting limits on gaming time and expenditure.

CONCLUSION

In conclusion, this study identified older adolescents, limited parental monitoring, and extensive social networks as high-risk factors for MGA among low-income adolescents. Recommendations include tailored intervention programs, referrals for addicted individuals, and collaboration among stakeholders, including the gaming industry, to promote responsible gaming. Implementing school-based preventive measures and self-regulation features in games are integral components of the proposed strategies.

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