

Internet Gaming Disorder Among Junior High School Adolescents in Jakarta: A Comparative Analysis Between Public and Private Schools

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Abstract

Background: The increasing availability of mobile games and expanding access to devices have contributed to the growing prevalence of Internet Gaming Disorder (IGD), particularly among adolescents. The IGD is associated with impaired well-being and functioning, including sleep, psychological, academic, and social problems. However, evidence regarding effective school-based interventions remains limited. This study aimed to explore the prevalence of IGD among junior high school students in public and private schools in Jakarta, Indonesia.

Methods: An analytic observational study with a cross-sectional design was conducted among 2,320 junior high school students from January to August 2025. Demographic data were collected using a basic questionnaire, and IGD was assessed using the Internet Gaming Disorder Test-10 (IGDT-10). Data were analyzed using the Chi-square test and Mann-Whitney test with SPSS version 23.0

Results: The prevalence of Internet Gaming Disorder (IGD) among junior high school adolescents in Jakarta was 2.2%. In private school, IGD was significantly associated with duration of gaming ≥ 4 hours/day and male gender, whereas in public school, IGD was significantly associated with the use of multiple gaming devices.

Conclusions: The prevalence of IGD among junior high school students in Jakarta was 2.2%. Factors associated with IGD varied between public and private schools, suggesting that prevention strategies should be tailored to the school context. Early identification of excessive gaming behaviors may support adolescent well-being and healthy development.

Keywords: Adolescent, internet gaming disorder, private school, public school, school-based prevention

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Introduction

Advances in mobile connectivity and the widespread of smartphones have increased adolescents' access to online games and intensified clinical and public-health concerns

regarding problematic gaming behaviors, including internet gaming disorder (IGD).^{1,2} Adverse outcomes related to IGD affect multiple domains of adolescent life, including physical health (notably sleep disruption), mental health symptoms, academic difficulties,

and social or family conflict.^{3,4} symptoms, prevalence, and aetiology. Method: We systematically reviewed the databases ERIC, PsyARTICLES, PsycINFO, PSYINDEX, and PubMed for the period January 1991 to August 2016, and additionally identified secondary references. Results: The proposed definition in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition provides a good starting point for diagnosing IGD but entails some disadvantages. Developing IGD requires several interacting internal factors such as deficient self, mood and reward regulation, problems of decision-making, and external factors such as deficient family background and social skills. In addition, specific game-related factors may promote IGD. Summarizing aetiological knowledge, we suggest an integrated model of IGD elucidating the interplay of internal and external factors. Interpretation: So far, the concept of IGD and the pathways leading to it are not entirely clear. In particular, long-term follow-up studies are missing. IGD should be understood as an endangering disorder with a complex psychosocial background. What this paper adds: In representative samples of children and adolescents, on average, 2% are affected by Internet gaming disorder (IGD). These problems may contribute to neurodevelopmental and behavioral consequences for learning trajectories and well-being. A meta-analysis of international studies estimated that the global prevalence of IGD among adolescents is 4.6% (95% CI 3.4–6.0).⁵

Previous studies have reported a prevalence of IGD among Indonesian adolescents ranging from 1.9% to 84.3%.^{6,7} Indonesia. In total, 1233 respondents (62.6% female and 20.3±1.90 years old). The distinct number of prevalence was due to the utilization of varied measurement tools. Following the introduction of IGD criteria in the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (DSM-5), a standardized screening instrument, the Ten-Item Internet Gaming Disorder Test (IGDT-10), was developed to assess IGD.⁶

Several studies have suggested that the risk and severity of IGD are greater among adolescents who spend longer periods gaming, participate in online or multiplayer games with friends, and access games through multiple devices/gadgets.^{8,9} A literature review of adolescent internet gaming disorder concluded that, beyond internal factors, gaming risk is also influenced by family factors, the school environment, and peers, highlighting that prevention efforts should strengthen the roles

of parents and teachers.¹⁰ Within the school-age peer ecology, social reinforcement can normalize and maintain excessive gaming; an Indonesian literature review identified *external* contributors including environment and “low social support” dynamics around gaming, and described how peer invitations and social interaction—both offline (peer influence) and in-game (gaming communities)—can function as reinforcing social support that is associated with more excessive use.^{10,11} These mechanisms emphasize the importance of the school setting, as schools shape adolescents’ daily routines and social interactions. Consequently, school-based health promotion has been proposed as a practical avenue for prevention and mitigation.¹¹ School-based intervention can reach large numbers of adolescents, reduce access barriers, cost-effective, and less stigmatizing than clinic-based intervention.¹²

In Indonesia, the school environment differs substantially between public and private institutions. Differences include language of instruction, curriculum orientation, study duration, emphasis on ethical values, pathways to higher education, facilities, and educational costs. Private schools generally require higher tuition fees and, provide more extensive facilities, whereas public schools are subsidized (low-cost/nearly-free), typically enroll larger numbers of students per class and may have fewer facilities.¹³ A recent study conducted among junior high school students in Central Sulawesi reported a higher prevalence of smoking among public school students compared with private school students. This pattern was associated with several factors, including strong peer influence and easier access to cigarettes. Adolescents often seek acceptance within peer groups perceived as prestigious, which may increase feelings of belonging, confidence, and social satisfaction. Smoking behavior may also be facilitated by the proximity of cigarette vendors to school environments and the affordability of cigarettes for adolescents.¹⁴ These findings raise questions regarding potential similarities and differences in gaming behavior between private and public schools in Jakarta.

A recent study from Spain reported that students in private schools had higher use of online video games than those in public school, which may be associated with socioeconomic status.¹⁵ family, social, and academic level. This research aimed to examine risk and protective factors involving incidence, persistence, and remission of gaming disorders symptoms (IGDs). However, evidence from Southeast

Asia, particularly Indonesia, remains limited despite substantial sociocultural and economic differences from Western settings. Furthermore, it remains unclear whether the distribution of IGD differs systematically between public and private junior high schools in urban Indonesian settings such as Jakarta. Therefore, this study aimed to estimate the prevalence of IGD among adolescents in Jakarta and evaluated the association of school setting and IGD, and gaming-related risk factors associated with IGD in public and private schools.

Methods

This study was an analytic observational study with a cross-sectional design conducted to examine the association between school type (public vs private) and Internet Gaming Disorder (IGD) among junior high school adolescents in Jakarta, Indonesia. Eight schools, consisting of six private schools (n=1,061) and two public schools (n=1,259), were selected using convenience sampling, and all students who reported playing games were included in the study.

Data collected was conducted from January to August 2025. Participants and their parents received information about the study procedure prior to data collection. Both were requested to provide electronic written informed consent through Google Forms. The questionnaire was distributed through electronic forms.

Ethical approval was obtained from the Health Research Ethics Committee of the Faculty of Medicine, Universitas Indonesia and Dr. Cipto Mangunkusumo National Hospital (KET-861/UN.F1/ETIK/PPM.00.02/2024).

The collected data included sociodemographic characteristics, gaming-related variables, and the validated Indonesian version of the Ten-Item Internet Gaming Disorder Test (IGDT-10).⁶Indonesia. In total, 1233 respondents (62.6% female and 20.3±1.90 years old) To minimize missing data, all questions were set as required. Sociodemographic characteristics included age, gender, and type of school (public vs private). Gaming related variables included duration of gaming (hour) per day, number and type of gadget used for gaming, and type of game mostly played (categorized into: puzzle, first person shooting, Massively Multiplayer Online Role-Playing Game (MMORPG), Multiplayer Online Battle Arena (MOBA), battle royale, simulation games, real time strategy games, augmented reality, fighting games, and sport/racing games).

The IGDT-10 is a screening instrument developed to identify Internet Gaming Disorder according to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5). The questionnaire consists of 10 items scored using a 3-point Likert scale (never = 0, sometimes = 1, often = 2) assessing nine diagnostic criteria of IGD: preoccupation, withdrawal, tolerance, loss of control, loss

Table 1 Validated Indonesian Version of the Internet Gaming Disorder Test (IGDT-10) Questionnaire

No	Question	Core Symptom	Never	Sometimes	Often
1.	When you were not playing, how often have you fantasized about gaming, thought of previous gaming sessions, and/or anticipated the next game? <i>Saat anda sedang tidak bermain game, seberapa sering anda membayangkan bermain game, memikirkan sesi permainan yang sebelum – sebelumnya, dan/atau menantikan permainan game yang berikut?</i>	Preoccupation	0	1	2
2.	How often have you felt restless, irritable, anxious and/or sad when you were unable to play or played less than usual? <i>Seberapa sering anda merasa gelisah, jengkel, cemas, dan/atau sedih saat anda tidak dapat bermain game atau bermain kurang dari biasanya?</i>	Withdrawal	0	1	2

Table 1 Continued

No	Question	Core Symptom	Never	Sometimes	Often
3.	Have you ever in the past 12 months felt the need to play more often or played for longer periods to feel that you have played enough? <i>Dalam 12 bulan terakhir, pernahkah anda merasa keinginan untuk bermain game lebih sering atau bermain dengan waktu yang lebih lama dari biasanya agar merasakan kepuasan?</i>	Tolerance	0	1	2
4.	Have you ever in the past 12 months unsuccessfully tried to reduce the time spent on gaming? <i>Dalam 12 bulan terakhir, pernahkah anda mencoba untuk mengurangi waktu yang digunakan untuk bermain game, namun gagal?</i>	Loss of Control	0	1	2
5.	Have you ever in the past 12 months played games rather than meet your friends or participate in hobbies and pastimes that you used to enjoy before? <i>Dalam 12 bulan terakhir, pernahkah anda lebih memilih bermain game dibandingkan bertemu dengan teman – teman atau melakukan hobi dan hiburan yang sebelumnya anda sukai?</i>	Loss of Interest	0	1	2
6.	Have you played a lot despite negative consequences (for instance losing sleep, not being able to do well in school or work, having arguments with your family or friends, and/or neglecting important duties)? <i>Apakah anda sering bermain game meskipun mengalami dampak buruk (seperti kurang tidur, tidak dapat mengikuti pelajaran sekolah atau bekerja dengan baik, berselisih dengan keluarga atau teman, dan/atau mengabaikan tugas – tugas penting)?</i>	Continuation	0	1	2
7.	Have you tried to keep your family, friends or other important people from knowing how much you were gaming or have you lied to them regarding your gaming? <i>Apakah anda pernah menyembunyikan dari keluarga, teman, atau orang terdekat lainnya mengenai seberapa sering anda bermain game atau pernah berbohong kepada mereka mengenai bermain game tersebut?</i>	Deception	0	1	2
8.	Have you played to relieve a negative mood (for instance helplessness, guilt, or anxiety)? <i>Pernahkah anda bermain game untuk menghilangkan perasaan negatif (seperti tidak berdaya, penyesalan, atau kecemasan)?</i>	Escape	0	1	2

Table 1 Continued

No	Question	Core Symptom	Never	Sometimes	Often
9.	Have you risked or lost a significant relationship because of gaming? <i>Pernahkah anda mempertaruhkan atau kehilangan hubungan dekat dengan orang lain karena bermain game?</i>	Negative Consequence	0	1	2
10.	Have you ever in the past 12 months jeopardized your school or work performance because of gaming? <i>Dalam 12 bulan terakhir, pernahkah prestasi sekolah atau kerja anda terancam karena bermain game?</i>	Negative Consequence	0	1	2

of interest, continuation despite negative consequences, deception, escape, and negative consequences. The Indonesian version of the instrument has previously been validated and demonstrated acceptable reliability. Completion time was approximately 10–15 minutes. Internet Gaming Disorder was defined as an IGDT-10 score ≥ 5 .⁶ Detailed items of the Indonesian IGDT-10 questionnaire are presented in Table 1.

The Chi-square test was used to evaluate bivariate association between the IGDT-10 score and the independent variables (gender, number of gadgets used, and type of school). The bivariate association between the IGDT-10 score and the duration of gaming each day was analyzed by the Mann-Whitney U Test, as the numerical data were not normally distributed according to Kolmogorov-Smirnov tests. The median was used to describe the average value of the numerical data, and the range from the minimum to the maximum was also included. Statistical analyses were

performed using Statistical Package for the Social Sciences (SPSS) software version 23.0 (IBM Corporation, Armonk, NY, USA). A p-value < 0.05 was considered statistically significant..

Results

Eight schools in Jakarta participated in the study, including two public schools and six private schools. A total of 2,320 students aged 13–15 years completed the questionnaire, with a median age of 14 years (interquartile range, 13–14 years). Of the participants, 1,259 (54.3%) attended public schools and 1,061 (45.7%) attended private schools (Table 2).

Overall a greater proportion of students from public schools completed the questionnaire compared with those from private schools. This difference may reflect variations in supervision during questionnaire administration. In public schools, students completed the questionnaire during scheduled morning assembly sessions, whereas in private schools, questionnaires

Table 2 Distribution of Students Across Junior High Schools

School Site and Type	Students per Site (n)	Students Who Completed The Questionnaire, n (%)
SITE 1 Public School	710	611 (86.0)
SITE 2 Public School	718	648 (90.3)
SITE 3 Private School	284	151 (53.2)
SITE 4 Private School	585	434 (74.2)
SITE 5 Private School	611	434 (71.0)
SITE 6 Private School	667	160 (24.0)
SITE 7 Private School	116	80 (68.9)
SITE 8 Private School	249	168 (67.5)

Table 3 Characteristics of Respondents from Eight Junior High Schools in Jakarta (n=2,320)

Characteristics	Total (n=2,320)	Public School (n=1,259)	Private School (n=1,061)	p-value
Age (year), median (min-max)	14 (13 -15)	14 (13 -15)	14 (13 -15)	0.049
Gender				
Male	1237 (53.3)	615 (48.9)	622(58.6)	<0.001
Female	1083 (46.7)	644 (51.1)	439 (41.4)	
Daily gaming duration, n (%)				
≥4 hours	837 (36.1)	481 (38.2)	356 (33.6)	0.020
1-3 hours	1,483 (63.9)	778 (61.8)	705 (66.4)	
Internet gaming disorder				
Yes	52 (2.2)	21 (1.6)	31 (2.9)	0.042
No	2268 (97.8)	1238 (98.3)	1030 (97.1)	
Number of gadgets used n (%)				
One gadget				
Smartphone	1223 (52.7)	899 (71.5)	324 (30.%)	<0.001
Tablet	73 (3.1)	39 (3.1)	34 (3.2)	0.883
Computer	87 (3.8)	23 (1.8)	64 (6.0)	<0.001
Console	21 (0.9)	14 (1.1)	7 (0.7)	0.252
Laptop	7 (0.3)	1 (0.1)	6 (0.6)	0.052
More than one gadget	909 (39.2)	283 (22.4)	626 (59.0)	<0.001
Type of game, n (%)				
MMORPG	723 (31.2)	410 (32.6)	313 (29.5)	0.112
MOBA	631 (27.2)	324 (25.7)	307 (28.9)	0.084
Battle Royale	255 (11.0)	137 (10.9)	118 (11.1)	0.854
Puzzle	251 (10.8)	159 (12.6)	92 (8.7)	0.002
Sport/Racing	161 (6.9)	97 (7.7)	64 (6.0)	0.114
First Person Shooting	154 (6.6)	77 (6.1)	77 (7.3)	0.271
Fighting Games	31 (1.3%)	7 (0.6)	24 (2.3)	<0.001
Real-Time Strategy Games	20 (0.9)	3 (0.2)	17 (1.6)	<0.001
Augmented Reality	16 (0.7)	10 (0.8)	6 (0.6)	0.507

Notes: MMORPG = massively multiplayer online role-playing game; MOBA = multiplayer online battle arena

were completed after school hours, when supervision was more limited because students were generally not permitted to access smartphones during school activities. Most respondents were male (53.3%).

Among all participants, 52 students (2.2%) met the criteria for Internet Gaming Disorder (IGD) based on an IGDT-10 score ≥5. Most respondents used smartphones for gaming (52.7%), whereas 39.2% used more than one gaming device. Massively multiplayer online role-playing games (MMORPGs) were the most frequently played game type (31.2%).

Students attending private schools were more likely to have IGD than those attending public schools (2.9% vs 1.7%, p=0.042). Furthermore, compared to students at public schools, more students at private schools also had access to more than one gaming device (59.0% vs 22.4%, p<0.001). In public schools, 71.5% of respondents (n = 899) reported using smartphones for gaming. MMORPGs remained the most commonly played game category in both public and private schools (Table 3).

Students attending private schools were more likely to have IGD than those in public

Table 4 Association Between Various Factors and Internet Gaming Disorder Status

Factor	IGD Yes (n=52) n (%)	IGD No (n=2268) n (%)	p-value	OR (95% CI)
Gender				
Male	41 (78.8)	1,196 (52.7)	<0.001	3.34 (1.71-6.53)
Female	11 (21.2)	1,072 (47.3)		ref
School type				
Public School	21 (40.4)	1,238 (54.6)	0.042	ref
Private School	31 (59.6)	1,030 (45.4)		1.77 (1.01-3.11)
Daily gaming duration,				
≥4 hours	20 (38.5)	1,463 (64.5)	<0.001	2.91 (1.65-5.12)
1-3 hours	32 (61.5)	805 (35.5)		ref
Number of gadgets used				
One gadget	22 (42.3)	1,389 (61.2)	0.006	ref
More than one gadget	30 (57.7)	879 (38.8)		2.15 (1.24-3.76)

Notes: CI = confidence interval; IGD = internet gaming disorder; OR = odds ratio.*Please recheck these values because they may be inconsistent with the previous table and with the reported OR

schools (OR 1.77 [95%CI 1.01-3.11], p=0.042). Furthermore, male students (3.34 [1.71-6.53], p<0.001), daily gaming duration of ≥4 hours (2.91 [1.65-5.12], p<0.001), and the use of multiple gaming devices (2.15 [1.24-3.76],

p=0.006) were all associated with higher risk of IGD (Table 4).

In the private-school subgroup (n=1,061), gaming duration was significantly associated with IGD status (p<0.001). Students who

Table 5 Factors Associated with Internet Gaming Disorder in Private and Public Schools

Factor	Private school (n=1,061)				Public school (n=1,259)			
	IGD+ n (%)	IGD- n (%)	p- value	OR (95% CI)	IGD+ n (%)	IGD- n (%)	p- value	OR (95% CI)
Gender			<0.001					
Male	29 (93.5)	593 (57.6)				12 (57.1)	603 (48.7)	0.443
Female	2 (6.5)	437 (42.4)		10.69 (2.54-45.02)	9 (42.85)	635 (51.3)		
Daily gaming duration								
≥4 hours	21 (67.7)	335 (32.5)	<0.001	4.36 (2.03-9.36)	11 (52.4)	470 (38.0)	0.178	
1-3 hours	10 (32.3)	695 (67.5)			10 (47.6)	768 (62.0)		
Number of gadgets used								
One gadget	10 (32.3)	425 (41.3)	0.315		12 (57.1)	964 (77.9)	0.024	
More than one gadget	21 (67.7)	605 (58.7)			9 (42.9)	274 (22.1)		0.38 (0.16-0.91)

Notes: CI = confidence interval; IGD = internet gaming disorder; OR = odds ratio

played games for ≥ 4 hours/day demonstrated a higher risk of IGD compared with those who played 1–3 hours/day (OR 4.357, 95% CI 2.029–9.355; $p < 0.001$). Gender was also associated with IGD, where students with higher IGDT-10 scores were predominantly male (93.5%), and males had higher risk of being IGD (OR 10.685, 95% CI 2.536–45.020; $p < 0.001$). The number of gadgets used was not significantly associated with IGD status in private schools ($p = 0.315$; OR 0.678, 95% CI 0.316–1.454) (Table 4).

In the public school subgroup ($n = 1,259$), gaming duration was not significantly associated with IGD ($p = 0.178$), and no significant association was observed between sex and IGD ($p = 0.443$; OR 1.404, 95% CI 0.587–3.356). However, the number of gaming devices used was significantly associated with IGD status ($p = 0.024$). Use of a single gaming device was associated with lower risk of IGD (OR, 0.38; 95% CI, 0.16–0.91), indicating a higher risk among students using multiple gaming devices (Table 5).

Discussion

The prevalence of Internet Gaming Disorder (IGD) identified using the IGDT-10 in this study was 2.2%. This estimate is within the range reported in previous Indonesian studies (1.9–84.3%)^{6,7} A significant association was observed between school type and IGD status, with students attending private schools demonstrating a 77% higher likelihood of IGD than those attending public schools. This finding suggests that school-contextual factors may influence vulnerability to problematic gaming behavior. Similar findings have been reported in previous studies indicating that aspects of the school environment, including school climate, school identification, and teacher–student relationships—are linked to adolescents' IGD risk and may operate through academic stress and anxiety pathways.¹⁶ Across the overall cohort, IGD was also significantly associated with longer gaming duration, and using more than one gaming devices, indicating that both exposure intensity and access-related factors may contribute to increased risk.⁴ However, these correlates were not uniformly reproduced across settings and in some instances appeared to diverge, implying context-specific effect modification. Gaming duration showed the most stable pattern overall, whereas within private schools neither gender nor gaming duration was associated with IGD, and within

public schools the number of gadgets was not associated. This heterogeneity is consistent with previous studies suggesting that gaming duration is a particularly robust behavioral determinant of IGD, while demographic associations (including gender) may vary depending on sample and context.⁴

Jakarta is characterized by substantial social and economic gaps, and access to higher-quality schools is unevenly distributed across neighborhoods, including formal and informal residential areas.¹⁷ Family socioeconomic status strongly influences the choice of junior high school. Public schools are generally government-funded and lower-cost, whereas private schools rely more on tuition fees and vary widely in quality and resources. Private schools may be secular or faith-based, including Islamic schools (madrasahs). In Indonesia, higher-income families are more likely to choose private (non-madrasah) schools, while lower-income households more often rely on public schools or madrasahs. Consequently, school type may partially reflect socioeconomic differences in access to opportunities and daily routines.¹⁸ These differences may explain the observed variation in IGD prevalence and associated factors between school settings. Direct comparative studies evaluating IGD between public and private school adolescents remain limited, highlighting the importance of the present findings. Previous studies have consistently shown that male adolescents demonstrate greater gaming involvement and higher risk of IGD, while prolonged gaming duration remains one of the strongest behavioral predictors of IGD.³ School workload and academic schedules may also influence stress and free time; academic expectation stress has been linked to online gaming disorder, and some adolescents may use gaming as an escape when distress increases.¹⁹ Ownership of multiple gaming devices may further facilitate gaming behavior and may reflect greater purchasing power, indirectly linking device access with socioeconomic status and school type.

Private schools in Jakarta demonstrated a higher proportion of male students than public schools, which was reflected in the distribution of IGD cases, most of which occurred among male students in private schools. This finding is consistent with the broader literature showing that boys have a higher prevalence of IGD than girls.^{3,5} However, sex was not statistically significant in the public-school model, which raises the possibility that other factors (e.g., motives for gaming, stress coping,

peer norms) may be more important drivers of problematic gaming in this setting. It is also possible that girls represent a hidden gaming population that is increasingly engaged in gaming over time, which could reduce observable gender differences in more gender-balanced school samples like ours.²⁰ MMORPG were the most commonly reported game genre, and adolescent studies suggest that role-playing game exposure (which overlaps with MMORPG features such as long play sessions, social immersion, and progression/reward loops) is associated with higher IGD risk.²¹ These findings suggest that sex differences in IGD may be more pronounced in private school settings but less distinct in public schools. Further studies evaluating gaming motives and behavioral functions according to sex and school setting are warranted.

Gaming duration of ≥ 4 hours/day was significantly associated with IGD in the overall sample and demonstrated a stronger association in private schools. A simple explanation is that longer daily gaming increases exposure to highly reinforcing game loops and tends to displace sleep and other daily roles, which can accelerate loss of control and functional impairment typical of IGD.^{22,23} In contrast, gaming duration was not statistically significant in public schools, which is interesting because the proportion reporting ≥ 4 hours/day was actually only slightly higher in public than private schools. This mismatch suggests that ≥ 4 hours/day may reflect different gaming patterns across settings (e.g., concentrated weekend sessions vs weekday play, more fragmented sessions, or differences in whether adolescents mostly play alone vs with peers/online groups), and it may also reflect limited power because public schools had fewer IGD cases. Future studies should distinguish between weekday and weekend gaming, evaluate gaming session consistency, assess peer gaming characteristics, and compare structured academic demands across school settings. Private schools often differ in curriculum orientation and extracurricular or religious programming, factors that may influence available leisure time and gaming behavior.²⁴

Access to gaming devices may influence gaming engaging because different platforms provide varying levels of graphics quality, controls systems, and convenience. Such access is often shaped by family socioeconomic status. Because private schools generally require higher costs than public schools,¹⁸ students in private schools may be more likely to own

multiple devices. Most participants in this study used a single device for gaming, although a substantial proportion reported using multiple devices. When stratified by school type, multi-device gaming was considerably more common among private school students. This distinction is important because the use of multiple devices can increase both access and flexibility, allowing gaming across more time periods and contexts. Emerging evidence suggests that combined device-use patterns (e.g., PC plus smartphone) are associated with a higher risk of IGD compared with single-device use.²⁵ Smartphones were the most commonly used gaming device in both school settings, particularly in public schools. Their portability and continuous accessibility may facilitate repeated exposure to gaming stimuli and reduce natural interruptions, thereby increasing vulnerability to problematic gaming behavior.^{25,26} gaming-related behaviors, and scales for Internet and smartphone addiction, depression, anxiety disorder, and substance use were collected. Combined users, especially those who played computer and smartphone games evenly, had higher prevalence of IGD, depression, anxiety disorder, and substance use disorder. These subjects were more prone to develop IGD than reference group (computer only gamers

Several limitation should be considered. More private schools were included in the study (six vs two schools), and the private school sector in Indonesia is highly heterogeneous, including both government-supported and independent institutions.²⁷ Therefore, the sample may not fully represent all private school types in Jakarta. In addition, religion-based schools, such as madrasahs or Islamic schools with structured religious activities after regular school hours, were not included in the analysis.

In conclusion, sex, school type, daily gaming duration, and the number of gaming devices used are associated with Internet Gaming Disorder among junior high school in Jakarta. Differences in gaming patterns between public and private schools partly reflect underlying socioeconomic disparities, variations in device access, daily routines, and gaming opportunities. These findings suggest that school-based interventions should be adapted according to school context and student characteristics while maintaining emphasis on reducing excessive gaming duration, high-risk gaming behaviors, and unrestricted multi-device access through education, screening, and targeted support. Internet Gaming

Disorder represents a modifiable lifestyle-related behavioral health problem that may impair adolescent well-being, supporting the importance school-based preventive to promote healthier lifestyles and long-term wellness.

Authors Contributions

ES conceptualized and designed the study, developed the research methodology, supervised data collection, performed the statistical analysis, interpreted the data, and drafted the manuscript. TW, LTM, KS, RS, S, ARH, and LNAA contributed to manuscript revision and provided critical intellectual input. All authors reviewed and approved the final version of the manuscript.

Conflict of Interest

The authors declare no conflict of interest.

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Generative AI Disclosure Statement

No Artificial Intelligence tools were used in the research, drafting, or editing of this work.

References

1. Meng SQ, Cheng JL, Li YY, Yang XQ, Zheng JW, Chang XW, et al. Global prevalence of digital addiction in general population: A systematic review and meta-analysis. *Clin Psychol Rev*. 2022;92:102128. doi:10.1016/j.cpr.2022.102128
2. King DL, Chamberlain SR, Carragher N, Billieux J, Stein D, Mueller K, et al. Screening and assessment tools for gaming disorder: A comprehensive systematic review. *Clin Psychol Rev*. 2020;77:101831. doi:10.1016/j.cpr.2020.101831
3. Paulus FW, Ohmann S, von Gontard A, Popow C. Internet gaming disorder in children and adolescents: a systematic review. *Dev Med Child Neurol*. 2018;60(7):645–59. doi:10.1111/dmcn.13754
4. Siste K, Hanafi E, Sen LT, Wahjoepramono POP, Kurniawan A, Yudistiro R. Potential correlates of internet gaming disorder among Indonesian medical students: Cross-sectional study. *J Med Internet Res*. 2021;23(4):e25468. doi:10.2196/25468
5. Fam JY. Prevalence of internet gaming disorder in adolescents: A meta-analysis across three decades. *Scand J Psychol*. 2018;59(5):524–31. doi:10.1111/sjop.12459
6. Siste K, Hanafi E, Sen LT, Damayanti R, Beatrice E, Ismail RI. Psychometric properties of the Indonesian Ten-item Internet Gaming Disorder Test and a latent class analysis of gamer population among youths. *PLoS One*. 2022;17(6):e0269528. doi:10.1371/journal.pone.0269528
7. Octavia GJ, Surilena S, Gustiawan E. Hubungan adiksi online game dengan motivasi belajar pada siswa sekolah menengah pertama di Jakarta Utara. *Damianus J Med*. 2020;19(2):113–7. doi:10.25170/djm.v19i2.1243
8. Alfaleh A, Alzاهر A, Alkattan A, Alabdulkareem K, Ibrahim MH. Prevalence of video gaming disorder in Saudi Arabia: a school-based national study. *J Egypt Public Health Assoc*. 2024;99(1):20. doi:10.1186/s42506-024-00165-9
9. Jeong H, Yim HW, Lee SY, Lee HK, Potenza MN, Lee H. Factors associated with severity, incidence or persistence of internet gaming disorder in children and adolescents: a 2-year longitudinal study. *Addiction*. 2021;116(7):1828–38. doi:10.1111/add.15366
10. Petrescu TC, Błachnio A, Enea V. Internet gaming disorder in children and adolescents: A systematic review of familial protective and risk factors. *Addict Behav*. 2025;167:108345. doi:10.1016/j.addbeh.2025.108345
11. Wu Y, Li H, Luo Z. Psychosocial risk factors and adolescent problematic internet gaming (PIG): The mediating roles of deviant peer affiliation and hedonic gaming experience. *Behav Sci (Basel, Switzerland)*. *Behav Sci (Basel)*. 2025;15(9):1177. doi:10.3390/bs15091177
12. Throuvala MA, Griffiths MD, Rennoldson M, Kuss DJ. School-based prevention for adolescent internet addiction: prevention is the key. A systematic literature review. *Curr Neuropharmacol*. 2019;17(6):507–25. doi:10.2174/1570159X16666180813153806
13. akranegara PA. Faktor diferensiasi sekolah di Indonesia. *Ideas J Pendidik Sos Budaya*. 2021;7(2):13. doi:10.32884/ideas.v7i2.335
14. Syam S, Sukirman PM, Firmansyah F, Suwendro NI, Lestari A. Smoking behavior among adolescents at a public junior high school. *J Heal Nutr Res*. 2023;2(3):210–20. doi:10.56303/jhnresearch.v2i3.221
15. Marrero RJ, Fumero A, Voltés D, González

- M, Peñate W. Individual and interpersonal factors associated with the incidence, persistence, and remission of internet gaming disorders symptoms in an adolescents sample. *Int J Environ Res Public Health*. 2021;18(21):11638. doi:10.3390/ijerph18211163816.
16. Yu Y, Yen SHY, Wang DB, Wu AMS, Chen JH, Zhang G, et al. School climate and school identification as determinants of internet gaming disorder among Chinese adolescent internet gamers: cross-sectional mediation study. *JMIR Serious Games*. 2024;12:e50418. doi:10.2196/50418
 17. Muhaimin AA, Gamal A, Setianto MAS, Larasati WL. The spatial justice of school distribution in Jakarta. *Heliyon*. 2022;8(11):e11369. doi:10.1016/j.heliyon.2022.e11369
 18. Asadullah MN, Maliki. Madrasah for girls and private school for boys? the determinants of school type choice in rural and urban Indonesia. *Int J Educ Dev*. 2018 Sep;62:96–111. doi:10.1016/j.ijedudev.2018.02.006
 19. Cheng Y, Jiang S, Chen J. Academic expectation stress and online gaming disorder among Chinese adolescents: The mediating role of psychological distress and the moderating role of stress mindset. *Child Youth Serv Rev*. 2024;158:107492. doi:10.1016/j.childyouth.2024.107492
 20. King DL, Potenza MN. Gaming disorder among female adolescents: A hidden problem?. *J Adolesc Heal*. 2020;66(6):650–2. doi:10.1016/j.jadohealth.2020.03.011
 21. Han H, Jeong H, Jo SJ, Son HJ, Yim HW. Relationship between the experience of online game genre and high risk of Internet gaming disorder in Korean adolescents. *Epidemiol Health*. 2020;42(11):499–506. doi:10.4178/epih.e2020016
 22. Pontes HM, Schivinski B, Kainen C, Montag C. The interplay between time spent gaming and disordered gaming: A large-scale world-wide study. *Soc Sci Med*. 2022;296:114721. doi:10.1016/j.socscimed.2022.114721
 23. Kristensen JH, Pallesen S, King DL, Hysing M, Erevik EK. Problematic gaming and sleep: A systematic review and meta-analysis. *Front Psychiatry*. 2021;12:675237. doi:10.3389/fpsy.2021.675237
 24. Sukmayadi V, Yahya AH. Indonesian education landscape and the 21st century challenges. *J Soc Stud Educ Res*. 2020;11(4):219–34.
 25. Paik SH, Cho H, Chun JW, Jeong JE, Kim DJ. Gaming device usage patterns predict internet gaming disorder: Comparison across different gaming device usage patterns. *Int J Environ Res Public Health*. 2017;14(12):1512. doi:10.3390/ijerph14121512
 26. Li Y, Tang Y, Huang S, Tan L, Huang Q, Chen X, et al. Role of gaming devices associated with internet gaming disorder in China: Cross-sectional Study. *JMIR Serious Games*. 2023;11:e40130. doi:10.2196/40130
 27. Stern JMB, Smith TM. Private secondary schools in Indonesia: What is driving the demand? *Int J Educ Dev*. 2016;46:1–11. doi:10.1016/j.ijedudev.2015.11.002