Gaming disorder among adolescent in Indonesia: A multi-settings cross-sectional study

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Abstract *Background and aim of the work:* The escalating phenomenon of online gaming among adolescents has emerged as a notable concern, exerting profound effects on their individual lives and interpersonal dynamics. The adolescents' struggle to effectively manage their emotional responses has been implicated in a spectrum of school-related disturbances. This study aims to investigate the prevalence of gaming disorder among adolescent in Indonesia. *Research design and methods:* This cross-sectional study was conducted among adolescents in the city of Banda Aceh in Indonesia. A multistage random sampling method was used to select 616 students from six junior high schools across the city. The presence of Internet gaming disorder was accessed using the Indonesian version Internet Gaming Disorder Scale-Short Form (IGDS9-SF). Descriptive statistics were used to analyze the data. *Results:* It was found that 30.8% of the adolescents had already experienced a gaming disorder. The mean score was 18.25 (SD = 6.773) and the subscales including preoccupation (Mean 2.43, SD=1.025), withdrawal (Mean. 1.88. SD=1.251), tolerance (Mean.2.42. SD=1.331), persistent (Mean.2.20. SD=1.323), displacement (Mean.1.74. SD=1.200), problem (Mean.1.83.SD=1.170), deception (Mean.1.55. SD=1.016), escape (Mean.2.68. SD=1.437), and conflict (Mean.1.52. SD=1.031). *Conclusions:* The prevalence of gaming disorder was relatively high among Indonesia adolescents. The high prevalence rate and high average scores indicate the need for stronger prevention and intervention programs to overcome gaming disorder. Comprehensive attention, particularly in schools, is necessary, along with preventive measures to reduce gaming disorder. (www.actabiomedica.it)

Key words: game online, disorder, adolescent, school based.

Introduction

The International Classification of Diseases (ICD-11) classifies both online and offline gaming as a recognized disorder. Addictive gaming is recognized as a condition that poses a risk to public health and well-being (1), and exhibits similarities to addictive behaviors seen in drug users. According to the American Psychiatric Association, Gaming Disorder (GD) is defined by a persistent behavioral pattern of internet use for online gaming, resulting in significant impairment or distress. This includes preoccupation with gaming, withdrawal from social interactions, a lack of tolerance, and an inability to limit gaming time (2). It can affect individuals of nearly any age, adolescents are the most at risk of developing it.

The prevalence of GD among adolescents aged 13 to 15 varies due to different testing methods and cultural backgrounds. In Asia, the incidence of game addiction among adolescents is 18.4%, which is higher compared to 1.6% in Europe (3). Due to social pressure and psychological demands, they play games regularly

to get satisfaction as part of entertainment. However, adolescence is a crucial period in the development and learning process because, at this age, people begin to integrate essential competencies into their identity (4).

Previous studies revealed various effects of GD, including poor academic achievement, depressive mood disorders, stress and anxiety disorders, and issues with social relationships ((5–7). Internet game addiction is also responsible for the presence of mood swings, aggressive and compulsive behavior, changes in eating and sleeping habits, body aches, anxiety, delusions, and occasionally having trouble telling the difference between the natural world and the virtual one in adolescents (8). Excessive use of GD could lead to a lack of self-awareness, interest loss, and difficulty for youth to grasp their surroundings (9–11). Due to issues with their motivation, adolescents with gaming disorders have slower learning processes, withdrawal, and a decreased desire to learn (12–14). Previous research findings strengthen the criteria for each aspect of gaming disorder (8,15,16). According to DSM-5, if there are only five of the nine symptom criteria that are included in the diagnosis of GD: 1) preoccupation with playing games; 2) withdrawal symptoms when video gaming is not available; 3) tolerance is showed by an increase in time duration; 4) relapse due to failed attempts to stop play; 5) loss of interest in other hobbies/ activities; 6) continuous and excessive use of video games; 7) deception of relatives, or others about the duration of time spent gaming; 8) mood modification occurs through the use of video games to escape, 9) conflict because of loss of significant interpersonal relationships and other opportunities (15).

However, several studies also state that playing video games can also improve individual well-being, which is influenced by the motivation to play games and the game's characteristics (16). Online social interaction carried out simultaneously while playing games can reduce symptoms of game addiction problems (17). Game development is also evolving to offer new perspectives that focus on player well-being (18). It highlights a growing recognition of the need to balance entertainment with mental health and safety considerations. This shift can help mitigate the risks of gaming disorder, particularly among vulnerable populations like adolescents.

The proliferation of online gaming in Indonesia is experiencing rapid growth. The government is actively promoting it as a burgeoning industry, organizing national competitions through the Ministry of Youth and Sports. However, concerns persist regarding gaming disorder, particularly its impact on adolescents. Official data on gaming disorder from the government remains limited, and the broader community often perceives online gaming as essential. This study seeks to explore the prevalence of gaming disorder among adolescents in Indonesia.

Participants and methods

This cross-sectional study was conducted in Banda Aceh, the capital of Aceh Province, Indonesia, where access to internet technology in public places is freely available. According to 2023 school data from the Aceh Statistics Center, there were 10,892 junior high school students in Banda Aceh. Participants were recruited from 37 junior high schools across the city using a multistage random sampling method. Initially, school locations within 4 KM and beyond 4 KM from the city center were randomized, followed by random selection of classes from six junior high schools, each contributing three classes out of a total of 21 classes with 34-35 students per class. In total, 616 participants were included from these six schools.

The Internet Gaming Disorder Scale-Short Form (IGDS9-SF) questionnaire (19) was used to gather data to determine the students' GD level. It had been previously used in the Indonesian version, with an internal consistency of 0.92 (20). It consists of nine questions using Likert Scales (ranging from 1 = never to 5 = very often). Each item question represents a gaming disorder subscale: Preoccupation, Withdrawal, Tolerance, Persistent, Displacement, Problem, Deception, Escape, and Conflict. Higher scores indicate a more severe problem with GD. The range of the overall score is 9 to 45. This study used a cut-off score in two categories: non-disorder (score range: 0–21) and disorder (score range: 32-45); the IGDS9-SF presented with a high internal consistency (Cronbach alpha a was 0.91) (21). The alpha of the instrument for this study was 0.8.

The Ethics Committee of the Faculty of Medicine, Universitas Syiah Kuala, approved the study (Reference Number: 100/EA/FK/2023). The parent or legal guardian signed written informed consent, and adolescents participate in research voluntarily.

Results

The median age of participants was 13 years, with a slight majority being girls (54.2%). A significant proportion owned an Android smartphone (87%), and about 22.8% reported playing games for over 3 hours daily. Gender appeared to influence the prevalence of Gaming Disorder (GD), with 30.8% of adolescents exhibiting low levels of GD (Mean=1.31, SD=0.462). This prevalence was notably impacted by gender composition, as most participants were girls (54.2%). Boys tended to be more susceptible to higher levels of gaming addiction compared to girls in this study. The boys seek entertainment and reduce stress more by playing online games (22). The demographic characteristics of study respondents are presented in Table 1.

Table 1. Socio-demographic of study respondents.

Data	Frequency	%	Mean
Age 13 14 15	350 74 191	56,8 12 31,2	13.52
Gender Boy Girl	282 334	45.8 54.2	1.54
Firstly, play a game 3-5 Years old 6-12 Years Old 13-16 Years Old	86 492 38	13,96 79,87 6,17	8.39
Having own android Yes No	536 80	87 13	1.13
Duration of Playing game per day Less than 3 hours More than 3 hours	476 140	77,1 22,8	2.07
Gaming Disorder Non disorder Disorder	426 190	69,2 30,8	1.31 (SD=0.462)

Furthermore, the prevalence of GD was 30,8%. The GD subscale including preoccupation (Mean 2.43, SD=1.025), withdrawal (Mean. 1.88. SD=1.251), Tolerance (Mean.2.42. SD=1.331), Persistent (Mean.2.20. SD=1.323), Displacement (Mean.1.74. SD=1.200), Problem (Mean.1.83.SD=1.170), Deception (Mean.1.55. SD=1.016), Escape (Mean.2.68. SD=1.437), and Conflict (Mean.1.52. SD=1.031). The descriptive presentation of the GD variables can be seen in Table 2.

Conclusion

The present study found approximately one third of adolescents suffering from GD. This finding was significantly lower than that recently reported in the neighboring setting of this study, where they found half of adolescent living in rural area of Aceh fall into risky gamers (23). However, it was higher that reported around four years ago at similar setting (11.9%) (24). The findings indicate a growing trend of GD among adolescents in Indonesia. Regarding the "Preoccupation" aspect, with the following items: "I often think about the last game I played or look forward to the next game," and "I feel like playing video games has taken over my free time", most respondents answered sometimes (34.7%), but some responded very often (2.3%). For those who answered usually in the context of this preoccupation, they identified that addictive games had become a necessity. This gaming behavior becomes excessive and will continue to be experienced by adolescents.

Table 2. The descriptive presentation of GD Subscale.

No.	GD Subscale/Aspects	Mean	SD
1	Preoccupation	2.43	1.025
2	Withdrawal	1.88	1.251
3	Tolerance	2.42	1.331
4	Persistent	2.20	1.323
5	Displacement	1.74	1.200
6	Problem	1.83	1.170
7	Deception	1.55	1.016
8	Escape	2.68	1.437
9	Conflict	1.52	1.031

Preoccupation often dominates individual thinking, so it can cause difficulties in focusing on other things. A game designed to provide rewards and reinforcement, leading to increased preoccupation. Previous related research indicated that concerns about gaming addiction predicted the development of gaming addiction symptoms over time among adolescents (25). Moreover, another study (26) identified that there was a significant correlation between preoccupation with video games and various adverse outcomes, including psychological disorders. The second aspect is "withdrawal," which involves feeling restless and uncomfortable when stopping gameplay, leading to moodiness, emotional sensitivity, and irritability. In this study, although only a small percentage of participants (7.1%) reported experiencing this very often, it is sufficient to show that a minority of adolescents have been affected by playing games. Withdrawal symptoms are an essential aspect of addiction, including gaming addiction (27). When individuals are addicted to gaming, they cannot curb their interest in continuing to play. As a result, they may experience various physical, emotional, and psychological symptoms. Withdrawal refers to the unpleasant symptoms that occur when a person who is addicted to gaming is unable to play. These symptoms typically appear immediately after stopping and can persist for some time, depending on the severity of the addiction and individual factors. Common withdrawal symptoms include irritability, discomfort, anxiety, mood changes, and a strong urge to play games. The second aspect is "withdrawal," which involves feeling restless and uncomfortable when stopping gameplay, leading to moodiness, emotional sensitivity, and irritability. In this study, although only a small percentage of participants (7.1%) reported experiencing this very often, it is sufficient to show that a minority of adolescents have been affected by playing games. Withdrawal symptoms are an essential aspect of addiction, including gaming addiction (27). When individuals are addicted to gaming, they cannot curb their interest in continuing to play. As a result, they may experience various physical, emotional, and psychological symptoms. Withdrawal refers to the unpleasant symptoms that occur when a person who is addicted to gaming is unable to play. These symptoms typically appear

immediately after stopping and can persist for some time, depending on the severity of the addiction and individual factors. Common withdrawal symptoms include irritability, discomfort, anxiety, mood changes, and a strong urge to play games. Empirical research supports the presence of withdrawal symptoms in individuals with gaming addiction (28). It describes those adolescents who met the criteria for problematic gaming showed withdrawal symptoms when unable to play games, including irritability and discomfort. Moreover, there is a variety of withdrawal symptoms by individuals with gaming disorders, including mood disturbances and physical pain. Empirical research supports the presence of withdrawal symptoms in individuals with gaming addiction (28). It describes those adolescents who met the criteria for problematic gaming showed withdrawal symptoms when unable to play games, including irritability and discomfort. Moreover, there is a variety of withdrawal symptoms by individuals with gaming disorders, including mood disturbances and physical pain. The "tolerance" aspect of online game addiction, namely the increasing activity of playing games. With the question item "Do you need to spend more time playing games to achieve satisfaction or enjoyment." Even though this domain has an average score of (31%) saying never, there are also (11.5%) saying they do this very often. Tolerance refers to the need to increase the amount of substance or behavior to the desired effect. In the context of gaming addiction, tolerance is manifested as an individual who needs more time spent playing games or more intense gaming experiences to the same level of pleasure or satisfaction as before. This escalation of gaming behavior can cause adverse effects on various aspects of life, including relationships, work or school performance, and physical health (29). The "tolerance" aspect of online game addiction, namely the increasing activity of playing games. With the question item "Do you need to spend more time playing games to achieve satisfaction or enjoyment." Even though this domain has an average score of (31%) saying never, there are also (11.5%) saying they do this very often. Tolerance refers to the need to increase the amount of substance or behavior to the desired effect. In the context of gaming addiction, tolerance is manifested as an individual who needs more time spent playing games or more intense

gaming experiences to the same level of pleasure or satisfaction as before. This escalation of gaming behavior can cause adverse effects on various aspects of life, including relationships, work or school performance, and physical health (29). Tolerance for gaming addiction is driven by psychological mechanisms such as habit and neural adaptation. The habit occurs when the individual becomes accustomed to the effects of the game over time, which leads to a decrease in response to the same level of stimulation. Thus, there is a need for higher levels of stimulation to get pleasure. Previous research linked tolerance as a significant aspect of game addiction (30), found that adolescents who showed problematic gaming behavior showed an escalation in the amount of time spent playing games over time, indicating the development of tolerance. Tolerance for gaming addiction is driven by psychological mechanisms such as habit and neural adaptation. The habit occurs when the individual becomes accustomed to the effects of the game over time, which leads to a decrease in response to the same level of stimulation. Thus, there is a need for higher levels of stimulation to get pleasure. Previous research linked tolerance as a significant aspect of game addiction (30), found that adolescents who showed problematic gaming behavior showed an escalation in the amount of time spent playing games over time, indicating the development of tolerance. Another aspect is "persistence," addressed with the question: "Do you repeatedly fail when trying to control or stop your gaming activities?" Among the respondents, 42% answered never, but 9.1% of adolescents reported failing very often. Related to displacement is the question: "Have you ever lost interest in previous hobbies and other entertainment activities because of your involvement with gaming?" Some (6.2%) said they lost interest very often. These results indicate that a key aspect of gaming addiction is persistent or intermittent gaming, characterized by sporadic yet ongoing involvement in gaming over time. These behavior patterns can significantly contribute to the development of gaming addiction. Persistent intermittent gaming can lead to psychological dependence, characterized by a compulsive need to play despite adverse consequences. Individuals with these gaming behavior patterns often experience withdrawal symptoms and changes in appetite when unable to play. This

psychological addiction can create a cycle of gaming addiction, where individuals seek gaming experiences to alleviate discomfort and satisfy their cravings (28). Another aspect is "persistence," addressed with the question: "Do you repeatedly fail when trying to control or stop your gaming activities?" Among the respondents, 42% answered never, but 9.1% of adolescents reported failing very often. Related to displacement is the question: "Have you ever lost interest in previous hobbies and other entertainment activities because of your involvement with gaming?" Some (6.2%) said they lost interest very often. These results indicate that a key aspect of gaming addiction is persistent or intermittent gaming, characterized by sporadic yet ongoing involvement in gaming over time. These behavior patterns can significantly contribute to the development of gaming addiction. Persistent intermittent gaming can lead to psychological dependence, characterized by a compulsive need to play despite adverse consequences. Individuals with these gaming behavior patterns often experience withdrawal symptoms and changes in appetite when unable to play. This psychological addiction can create a cycle of gaming addiction, where individuals seek gaming experiences to alleviate discomfort and satisfy their cravings (28).

Related to the "Displacement" question: "Have you lost interest in other previous hobbies and entertainment activities because of your involvement with gaming?" Some stated that they lost interest very often (6.2%). Displacement refers to how they priorities playing games over other essential aspects of their lives, such as work, school, relationships, and personal responsibilities. This behavior can significantly adversely affect the well-being and functioning of the individual. Related research can help understand redirection or displacement in the context of gaming addiction. Displacement or "Distraction" in gaming addiction can lead to social dysfunction, characterized by withdrawal from real-life social interactions and a decrease in interpersonal relationships, finding that individuals with gaming dependence often report ignoring family and friends for gaming activities. It causes a feeling of isolation and loneliness (31). Regarding the "problem" aspect of the question item, "have you ever continued gaming activities even though you knew they were causing problems for you and others?" and

5.6%, said very often. Problems associated with gaming addiction can have adverse effects on mental, emotional, social, and physical well-being. Addressing this problem requires a comprehensive approach that includes early intervention, psychological support, and education on healthy playing habits (25).Regarding the "problem" aspect of the question item, "have you ever continued gaming activities even though you knew they were causing problems for you and others?" and 5.6%, said very often. Problems associated with gaming addiction can have adverse effects on mental, emotional, social, and physical well-being. Addressing this problem requires a comprehensive approach that includes early intervention, psychological support, and education on healthy playing habits (25). Judging from the "escape" aspect, the question of whether you play to temporarily escape or get rid of negative moods (such as helplessness, guilt, and anxiety?), the result showed that around 98 adolescents said it very often. The concept of Escape is an integral part of the understanding of gaming addiction, as people often turn to playing a game to escape from real-life stress, challenges, or negative emotions. Escape serves as a mechanism of overcoming for individuals seeking temporary relief from their problems, but when it becomes excessive and uncontrollable, it can lead to the development of addiction. Previous studies have consistently shown that people play games as a mechanism to cope with stress, anxiety, depression, and other negative emotions. A study (32) found that individuals with gaming addiction have higher levels of stress and escapism motives for playing games compared to non-dependent individuals. Games provide a temporary disruption from real-life problems, offering a sense of control, achievement, and excitement that may be lost in everyday life. Judging from the "escape" aspect, the question of whether you play to temporarily escape or get rid of negative moods (such as helplessness, guilt, and anxiety?), the result showed that around 98 adolescents said it very often. The concept of Escape is an integral part of the understanding of gaming addiction, as people often turn to playing a game to escape from real-life stress, challenges, or negative emotions. Escape serves as a mechanism of overcoming for individuals seeking temporary relief from their problems, but when it becomes excessive and uncontrollable, it can

lead to the development of addiction. Previous studies have consistently shown that people play games as a mechanism to cope with stress, anxiety, depression, and other negative emotions. A study (32) found that individuals with gaming addiction have higher levels of stress and escapism motives for playing games compared to non-dependent individuals. Games provide a temporary disruption from real-life problems, offering a sense of control, achievement, and excitement that may be lost in everyday life. The final aspect "conflicts with the question: Have you ever endangered or lost a meaningful relationship, job, or educational or career opportunity because of your gaming activities? Twenty-four adolescents stated it very often. This finding indicates that we have more concern about game addiction among adolescents. The final aspect "conflicts with the question: Have you ever endangered or lost a meaningful relationship, job, or educational or career opportunity because of your gaming activities? Twenty-four adolescents stated it very often. This finding indicates that we have more concern about game addiction among adolescents. Conflict is a crucial aspect of gaming addiction that covers various forms of interpersonal and intrapersonal conflict arising from excessive gaming behavior. These conflicts can affect relationships and academic or work performance. Gaming addiction can also lead to intrapersonal conflicts, such as guilt, shame, or self-accusation associated with excessive gaming behavior. A previous study (33) found that individuals with gaming addiction often experience internal conflicts between their desire to play games and their awareness of the negative consequences associated with their dependency. This internal conflict can contribute to feelings of hardship and low self-esteem. Conflict is a crucial aspect of gaming addiction that covers various forms of interpersonal and intrapersonal conflict arising from excessive gaming behavior. These conflicts can affect relationships and academic or work performance. Gaming addiction can also lead to intrapersonal conflicts, such as guilt, shame, or self-accusation associated with excessive gaming behavior. A previous study (33) found that individuals with gaming addiction often experience internal conflicts between their desire to play games and their awareness of the negative consequences associated with their

dependency. This internal conflict can contribute to feelings of hardship and low self-esteem. The gaming disorder rate of 30.8% indicates that almost a third of the sample population is addicted to gaming (22, 21). Overall, the data showed that while some aspects of gaming addiction, such as escape and preoccupation, had higher scores, others, such as conflict and deception, had lower scores. This illustrates the variation in gaming disorder symptoms experienced by individuals in this sample, highlighting a significant issue that requires targeted prevention and intervention efforts. The gaming disorder rate of 30.8% indicates that almost a third of the sample population is addicted to gaming (22, 21). Overall, the data showed that while some aspects of gaming addiction, such as escape and preoccupation, had higher scores, others, such as conflict and deception, had lower scores. This illustrates the variation in gaming disorder symptoms experienced by individuals in this sample, highlighting a significant issue that requires targeted prevention and intervention efforts. This study has several research limitations, including potential hesitancy among participants to report their condition anonymously due to possible consequences. Furthermore, the study did not examine the association between variables nor explore the impact of gaming on participants' daily lives. Therefore, further qualitative research is crucial to investigate school perceptions regarding the impact of gaming disorder and to develop strategies for its prevention and treatment within a school-based setting. This study has several research limitations, including potential hesitancy among participants to report their condition anonymously due to possible consequences. Furthermore, the study did not examine the association between variables nor explore the impact of gaming on participants' daily lives. Therefore, further qualitative research is crucial to investigate school perceptions regarding the impact of gaming disorder and to develop strategies for its prevention and treatment within a school-based setting.

Ethics committee: The research followed the WHO's 2011 7th standard and was authorized by the Ethical Fallboard, Faculty of Medicine, USK, with approval number 100/EA/FK/2023, July 3, 2023.

Conflict of interest: Each author declares that they have no commercial associations (e.g., consultancies, stock ownership, equity interest, patent/licensing arrangement, etc.) that might pose a conflict of interest concerning the submitted article.

Authors' contribution: BS wrote and conducted literature studies, formulated ideas, and collected data. MR edited and evaluated ideas and supervised articles. RS provided literature for developing ideas. MT added ideas to the article and identified related references. After working together to edit and revise the manuscript, all authors approved the final version after evaluating it.

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