

Mobile Game Addiction and Academic Achievement among Senior High School Students: A Convergent Mixed-Methods Study in a Philippine Public School

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ABSTRACT

This study employed a Convergent Mixed-Methods Design to examine how mobile gaming influences students' behaviour, study habits, physical well-being, and academic obligations within a senior high school educational context. The quantitative component involved 58 Grade 11 students from Section X in the Philippines who answered a 10-item Likert-scale survey assessing gaming habits, academic distractions, sleep problems, physical symptoms, and coping strategies. Data were analyzed using weighted means, frequency distributions, and Pearson's correlations. The qualitative component consisted of semi-structured interviews with ten purposively selected participants. The thematic analysis revealed three major themes: (1) gaming for enjoyment and escape, (2) physical discomfort and sleep loss, and (3) difficulty managing academic responsibilities alongside failed attempts at self-regulation. Findings indicated that greater gaming involvement was associated with reduced focus, sleep deprivation, decreased motivation, and neglect of academic tasks. Quantitative results revealed a moderate negative relationship between mobile game addiction and academic performance ($r = -.52, p < .001$). Qualitative narratives further explained how sleep loss, cognitive fatigue, and reinforcement-driven habits contributed to academic disengagement despite students' awareness of negative consequences. The study highlights the importance of digital literacy programs, structured guidance interventions, and school-based strategies that promote responsible gaming habits and academic self-regulation among learners.

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1. Introduction

Online gaming is one of the most widely used recreational activities among young people and teenagers (Islam et al., 2020). People play online and mobile games for a variety of reasons, including stress relief and release, relaxation,

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enjoyment, social interaction, challenge, and as a means of escape from reality. There are several studies that have indicated that gaming can be an effective method for students dealing with academic stress (Arreola et al., 2023).

Recent national reports indicate that over 90% of Filipino adolescents have access to smartphones, and mobile gaming ranks among the most frequently reported digital activities among secondary school students (DataReportal Philippines, 2024). With increasing internet penetration across Philippine schools, concerns regarding excessive gaming and its academic implications have intensified.

However, the growing use of digital technology has also contributed to the rising phenomenon of excessive and compulsive gaming. Mobile game addiction is typically defined as a form of behavioral addiction that entails excessive involvement in gaming behavior that leads to everyday functioning, academic performance, and overall life problems. Excessive gaming has been discovered to lead to shorter attention spans, as well as increasing difficulties that hinder students from focusing on their academic obligations (Griffiths, 2005). Further studies also state that excessive gaming has been linked to physical health issues such as poor sleep quality, eye strain, and headaches that can potentially impact academic performance (Shiers, 2020).

In the Philippine setting, the increased internet accessibility and the use of smartphones have highly influenced mobile gaming among senior high school students. Although technology assists in teaching, the high rate of gaming among students has raised concerns about the decrease in academic performance and the lack of attention in classes. Previous research has already established a correlation between excessive gaming and a decline in academic performance, especially if the students feel physical discomfort and fatigue that affect their performance in class (Choi et al., 2018; Israel, 2018). While existing studies have established statistical associations between excessive gaming and academic performance, they offer limited insight into internal struggles, self-regulation failures, and motivational conflicts experienced by students. Without understanding these mechanisms, school-based interventions remain largely superficial and behaviorally ineffective. This limitation is particularly evident in Philippine senior high school contexts, where smartphone accessibility and post-pandemic digital habits have intensified mobile gaming engagement.

Nonetheless, despite the increasing number of studies conducted on gaming behavior, many of these studies rely predominantly on quantitative methods, which may not fully capture the emotional, behavioral, and motivational processes that explain why students continue to engage in excessive gaming despite its negative consequences. While prior research has established statistical associations between mobile gaming and academic performance, limited attention has been given to students' internal struggles with self-regulation and their lived experiences in managing academic demands alongside gaming habits.

Although the negative academic effects of excessive gaming are well documented, existing research remains largely correlational and offers limited explanation for why students persist in gaming behaviors they recognize as harmful. This unresolved paradox—high awareness alongside failed self-regulation—represents a critical blind spot in the literature. Addressing this gap, the present study employs a convergent mixed-methods design that integrates quantitative correlations with students lived experiences to illuminate the cognitive, emotional, and behavioral mechanisms sustaining academic disengagement and undermining effective learning behaviors among senior high school students in a Philippine public school context. Accordingly, the present study investigates how mobile game addiction affects the academic performance of Grade 11 Section X students by integrating quantitative survey findings with qualitative insights drawn from students' lived experiences.

1.1 Research Objectives and Questions

To address the identified gap, the present study investigates mobile game addiction and academic achievement using a convergent mixed-methods approach that combines statistical relationships with students' lived experiences.

Specifically, the study seeks to:

- determine the level of mobile game addiction among senior high school students,
- examine the relationship between gaming behavior and academic performance, and

- explain how students experience and manage gaming alongside academic responsibilities.

Guided by these objectives, the study addresses the following research questions:

RQ1. What is the level of mobile game addiction among Grade 11 students?

RQ2. Is there a significant relationship between mobile game addiction and academic performance?

RQ3. How do students describe their experiences in managing mobile gaming alongside academic responsibilities?

RQ4. How do qualitative findings explain or expand upon the quantitative results?

2. Literature Review

2.1. Physical Health Effects of Excessive Mobile and Online Gaming

Excessive involvement in mobile and online gaming has been linked to numerous physical health concerns. Zamani et al. (2009) established a significant positive correlation between computer game addiction and physical health problems such as headaches, lack of physical activity, and insomnia among students. Likewise, excessive involvement in gaming behavior has been associated with fatigue, eye strain, headaches, and poor personal care (Männikkö et al., 2015).

Musculoskeletal disorders are also frequently reported outcomes of prolonged gaming exposure. According to Tholl et al. (2022), static postures during gaming can cause pain in the wrists, shoulders, and back. Repetitive motions of the hands and fingers have likewise been shown to contribute to musculoskeletal strain, including carpal tunnel syndrome (Jenkins et al., 2013; Tai et al., 2004).

More recently, global public health authorities have formally recognized problematic gaming as a health concern. The World Health Organization (2019) officially included Gaming Disorder in the International Classification of Diseases (ICD-11), defining it as a pattern of gaming behavior characterized by impaired control and continuation despite negative consequences. This recognition underscores the potential physical and psychological risks associated with excessive gaming. Furthermore, a large-scale study in Southeast Asia by King et al. (2020) reported that problematic gaming was significantly associated with sleep disturbance, physical fatigue, and reduced overall well-being among adolescents. These findings reinforce the need to examine gaming behaviors within educational contexts.

2.2. Sleep Deprivation, Fatigue, and Cognitive Readiness for Learning

Sleep-related disturbances remain among the most consistently reported consequences of excessive gaming. Király et al. (2015) noted that compulsive gaming often results in delayed sleep and disrupted daily routines. Sheppard and Wolffsohn (2018) emphasized that prolonged screen exposure contributes to digital eye strain, discomfort, and headaches. Shiers (2020) further observed that students who engage in late-night gaming frequently experience reduced alertness and diminished classroom focus.

More recent empirical research strengthens these concerns. Studies have shown that problematic gaming and excessive screen use are associated with sleep disturbance and daytime fatigue among adolescents (Kwok et al., 2021; Zaman et al., 2022). In addition, nighttime gaming behavior has been linked with delayed sleep timing and poorer sleep quality, which correspond with reduced academic functioning and attention during the day (Scott et al., 2019; Sun et al., 2023). These findings suggest that sleep deprivation associated with excessive gaming may affect students' cognitive readiness and classroom engagement.

2.3. Academic Performance and Learning Disruptions Associated with Excessive Gaming

Beyond physical and sleep-related effects, literature consistently demonstrates a negative association between excessive gaming and academic performance. Jackson et al. (2011) found that excessive internet and video game use was linked to poorer academic outcomes due to attentional difficulties. Demir and Kutlu (2018) concluded that

students with higher gaming addiction scores exhibited lower academic achievement. Choi et al. (2018) likewise reported that excessive gaming disrupts daily routines and reduces academic focus.

More recent meta-analytic evidence further confirms this relationship. Adams et al. (2022) conducted a systematic review and meta-analysis and found a statistically significant negative association between problematic gaming and academic achievement across adolescent samples. Their findings suggest that the relationship is consistent across cultural contexts, reinforcing the need for localized investigation within Philippine senior high schools.

2.4. Behavioral Addiction, Reinforcement Mechanisms, and Self-Regulation Failure

Mobile game addiction shares characteristics with other behavioral addictions, including impaired self-control and persistence despite awareness of harm (Király et al., 2015). Reinforcement mechanisms embedded in mobile games—such as achievement systems and variable rewards—have been shown to sustain repetitive engagement (Sayeed et al., 2021). Professional organizations have also emphasized the importance of structured limits and guided media use among adolescents to reduce problematic digital engagement (American Academy of Pediatrics, 2016).

Building on this, Montag et al. (2021) emphasized that reinforcement-driven digital behaviors may impair executive functioning and weaken self-regulation over time. The American Academy of Pediatrics (2016) recommended limiting screen time to mitigate these effects, while Israel (2018) highlighted the importance of balanced lifestyle interventions. Collectively, contemporary research suggests that excessive gaming operates not merely as a leisure activity but as a reinforcement-based behavioral cycle that can interfere with academic responsibilities.

2.5 Synthesis of Literature and Identified Research Gap

Across the reviewed literature, three recurring pathways emerge through which mobile gaming affects academic performance: physiological depletion (sleep loss and fatigue), cognitive overload (reduced attention and mental exhaustion), and behavioral reinforcement (habit formation and loss of self-control). However, few studies empirically connect these pathways within a single research design, nor do they integrate students' subjective experiences with measurable academic outcomes. Moreover, limited research has focused specifically on senior high school students within a Philippine school context. This gap underscores the need for a convergent mixed-methods approach that combines quantitative evidence with qualitative insights to provide a more comprehensive understanding of mobile game addiction as an educational concern.

Based on this gap in the literature, the present study seeks to contribute to existing knowledge by employing a convergent mixed-methods design to examine not only the academic impact of mobile game addiction but also the underlying behavioral and motivational factors influencing students' gaming practices. By integrating statistical findings with students' lived experiences, the study aims to offer a more unified and contextually grounded perspective on mobile game addiction and its effects on the academic performance of Grade 11 students.

3. Methods

3.1. Research Design

The study employed a Convergent Parallel Mixed-Methods Design, in which quantitative and qualitative data were collected concurrently, analyzed independently, and integrated during interpretation to obtain a comprehensive understanding of the phenomenon (Creswell & Plano Clark, 2018). This design was selected to allow statistical examination of relationships between mobile game addiction and academic performance while simultaneously exploring students' lived experiences and self-regulation struggles. Integration occurred through triangulation, enabling convergence, complementarity, and expansion of findings.

3.2. Population of the Study

The study was conducted in a public senior high school in the Philippines during the 2023–2024 academic year. The school serves students from diverse socioeconomic backgrounds and follows the K–12 Basic Education Curriculum. The research employed a mixed-methods design utilizing two distinct phases: for the Quantitative Phase, Total Enumeration Sampling was used, including all 58 students from Grade 11-X (Section) to ensure complete representation for the survey component; the instrument was a validated 10-Item Likert Scale Survey that measured gaming frequency, academic impact, and physical effects, and underwent reliability testing using Cronbach's Alpha. For the Qualitative Phase, Purposive Sampling was used to select ten students identified as frequent gamers to provide information-rich experiences, utilizing a Semi-Structured Interview Guide to explore their in-depth challenges and efforts to manage mobile gaming. The sample size was considered adequate for correlation analysis within a bounded population and ensured full representation of the target group through total enumeration. Participants for the qualitative phase were selected using criterion-based purposive sampling. Students were identified as frequent gamers based on their survey responses indicating high gaming frequency and elevated addiction scores. This approach ensured that interview participants possessed direct and information-rich experiences relevant to the phenomenon under investigation, thereby enhancing the explanatory depth of the qualitative findings.

3.3. Research Instrument

The Research Instrument for this mixed-methods study consisted of two validated tools: a Quantitative Instrument and a Qualitative Instrument. The Quantitative Instrument was a 10-Item Likert Scale Survey used to measure gaming frequency, academic impact, sleep and physical health effects, concentration and motivation issues, self-regulation and coping, and the use of gaming as escape; responses utilized a 5-point Likert scale (1=Strongly Disagree to 5=Strongly Agree), and the survey's reliability was confirmed through expert validation and Cronbach's Alpha testing. Complementing this, the Qualitative Instrument was a Semi-Structured Interview Guide consisting of open-ended questions designed to explore students' in-depth experiences with mobile gaming, academic challenges, and personal efforts to manage their gaming habits. The process of purposive sampling was repeated until data saturation had been gained which means that no new themes or substantial information were received during the last interviews. This repeated methodology was used to make sure that the sample size of $n=10$ was adequate to investigate the richness and variety of the student experiences as far as mobile gaming habits are concerned. The semi-structured interview guide was developed based on the study's research questions and key constructs identified in the literature, including sleep deprivation, cognitive fatigue, reinforcement mechanisms, and self-regulation difficulties. Questions were designed to be open-ended, allowing participants to elaborate on their experiences while ensuring alignment with the quantitative constructs measured in the survey. The guide was reviewed by two experts in educational psychology to ensure clarity, relevance, and alignment with the study objectives.

3.4. Ethical Clearance and Data Handling

Ethical standards were strictly observed throughout the mixed-methods research to preserve rights of all participants. Before collecting data, the school principal, research adviser, and concerned teachers gave permission to conduct the study. The researchers provided explicit information about the study's objective, methodology, and scope, and participants were told that their participation was fully voluntary. All respondents provided informed consent, and they were advised that they could decline or withdraw from the study at any moment with no consequences. To protect confidentiality and anonymity, personal identifiers were not collected, and data was recorded and reported using codes rather than names. All survey results and interview transcripts were strictly confidential and used only for academic purposes. The researchers ensured that questions asked in both the survey and interviews were respectful, non-intrusive, and age-appropriate, especially since students discussed their gaming habits and academic challenges.

3.5. Data Analysis

The mixed-methods study had a data analysis and statistical treatment that was developed to guarantee rigor and findings integration. A number of statistical tools were utilized in the Quantitative Analysis, which included Frequencies and percentages (to describe data), Weighted Mean and interpretation, Standard Deviation and the Pearson Product-Moment Correlation (ρ) to establish the relationship between gaming and academic success; Cronbach Alpha (α) was also used to indicate the reliability of the survey tool. Pearson's r was deemed appropriate as the variables were continuous and met the assumptions of normality and linearity. At the same time, the Qualitative Analysis presupposed Thematic analysis performed with the help of coding, categorizing, and developing themes to learn the experiences of students. Lastly was the Achievement of the Integration through Triangulation matrix that logically compared the quantitative output and qualitative themes to find convergence, complement, and development of new knowledge thereby confirming the general findings. The 10-Item Likert Scale Survey showed an excellent internal consistency with Cronbach Alpha $\alpha = 0.85$, which supports the reliability of the scale to construct the addiction with mobile games among this group of population.

The following statistical methods were employed to analyze the quantitative data obtained from the 10-item Likert scale:

Equation 1: Frequency and Percentage Distribution (Used to describe demographic data and response patterns).

$$\text{Percentage} = \frac{f}{N} * x 100$$

Equation 2: Weighted Mean (Used to determine the average response for each Likert item).

$$\bar{x} = \frac{\sum(F_i S_i)}{N}$$

Mean Range Interpretation

4.21 – 5.00 Strongly Agree

3.41 – 4.20 Agree

2.61 – 3.40 Neutral

1.81 – 2.60 Disagree

1.00 – 1.80 Strongly Disagree

Equation 3: Standard Deviation (Measures variability in responses).

$$SD = \sqrt{\frac{\sum(X-\bar{X})^2}{N-1}}$$

Equation 4: Cronbach's Alpha (Evaluates the internal consistency of the 10-item scale).

$$\alpha = \frac{k}{k-1} \left(1 - \frac{S \sum S_T^2}{S_T^2} \right)$$

Equation 5: Pearson Product-Moment Correlation (r) (Determines the relationship between gaming hours/addiction score and academic performance).

$$r = \frac{n - (\sum xy) - (\sum x)(\sum y)}{\sqrt{[\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

3.6 Trustworthiness and Credibility

To ensure qualitative rigor, several strategies were implemented. First, member checking was conducted by summarizing key interview responses and confirming interpretations with participants to enhance credibility. Second, peer debriefing with the research adviser was undertaken to review emerging themes and minimize researcher bias. Third, a systematic coding process was followed, including initial coding, category development, and theme refinement. An audit trail documenting analytic decisions was maintained to strengthen transparency and dependability. The integration of quantitative and qualitative findings through triangulation further enhanced the overall validity of the study.

4. Results

This section presents the study findings based on the research objectives. The quantitative and qualitative findings describe patterns related to mobile gaming behavior and academic performance among Grade 11 students. The quantitative analysis indicated a negative relationship between gaming hours, addiction levels, and reported academic performance.

These quantitative patterns were supported by qualitative responses, as students reported sleep deprivation, reduced concentration, procrastination, and incomplete academic work during extended gaming periods.

4.1. Quantitative Findings

The quantitative results indicated patterns relating mobile gaming behavior to sleep, attention, and academic engagement.

4.1.1 Relationship Between Mobile Gaming and Academic Performance

A Pearson product–moment correlation was conducted to examine the relationship between mobile gaming and academic performance. Results showed a moderate negative relationship between gaming hours and academic performance, $r(56) = -.48, p = .001$. Similarly, addiction scale scores were moderately negatively related to academic performance, $r(56) = -.52, p < .001$, indicating that higher gaming involvement corresponds with lower academic performance.

Table 4.1. Pearson Correlation Between Mobile Game Addiction and Academic Performance ($N = 58$)

Variable	r	p	Interpretation
Gaming Hours & Academic Performance	-0.48	.001	Moderate Negative
Addiction Score & Academic Performance	-0.52	< .001	Moderate Negative

Students reporting higher gaming involvement also reported sleep loss, reduced concentration, and lower motivation during academic activities. These patterns were observed across multiple survey items measuring gaming habits and study routines.

4.2. Qualitative Findings

Qualitative data were collected through semi-structured interviews with ten purposively selected participants identified as frequent mobile gamers. Four themes described students' experiences of mobile gaming and academic responsibilities.

Students described mobile gaming as a source of enjoyment and a way of coping with stress, boredom, and academic pressures, sometimes prioritizing gaming over school tasks. Participants also reported physical effects such as eye strain, headaches, body fatigue, and sleep deprivation associated with late-night gaming sessions.

Students reported difficulty completing assignments, sustaining attention in class, and allocating adequate study time due to extended gaming. Despite awareness of its effects, participants described repeated unsuccessful attempts to regulate gaming behavior. These attempts were associated with habit formation, social influences, and in-game motivations.

Theme 1: Gaming for Enjoyment and Escape

The students described mobile gaming as a source of enjoyment. They used mobile gaming as a means of coping with stress, boredom, and academic pressures, at times prioritizing gaming over academic responsibilities.

One participant explained, "I know I should stop playing, but once I start, I forget the time and my schoolwork."

Theme 2: Physical Discomfort and Sleep Loss

Students reported physical effects such as eye strain, headaches, body fatigue, and sleep deprivation caused by late-night gaming sessions.

As one student shared, "I play at night to relax, but then I feel very sleepy in class the next day."

Theme 3: Academic Difficulty and Procrastination

Students admitted that it was difficult to complete assignments, sustain attention in class, and allocate adequate study time due to excessive gaming.

One participant noted, “Sometimes I plan to study, but I keep playing first until it’s already too late.”

Theme 4: Failed Self-Regulation of Gaming Behavior

Despite being mindful of the detrimental impact of mobile gaming on academics and health, students found it difficult to regulate their gaming behavior. Failed attempts to control screen time were linked to habit development, social influences, and strong in-game motivations.

Another student stated, “I tried deleting the game, but I just downloaded it again after a few days.” These qualitative findings are consistent with the quantitative patterns observed in the survey results.

Table 1. Demographic Profile of Respondents (N = 58)

Profile	Category	Frequency (f)	Percentage (%)
Gender	Male	34	58.62%
	Female	24	41.38%
Age	16 years old	12	20.69%
	17 years old	33	56.90%
	18 years old	13	22.41%
Average Gaming Hours (Weekdays)	0–2 hours	16	27.59%
	3–4 hours	23	39.66%
	5 hours and above	19	32.76%
	Excellent	4	6.90%

Table 2. Weighted Mean of the 10-Item Likert Scale on Mobile Game Addiction (N =58)

Statement (Shortened)	Mean	Interpretation
(1) More time gaming than studying	3.62	Agree
(2) Sleep reduced due to gaming	3.95	Agree
(3) Sleepiness in class because of gaming	3.95	Agree
(4) Gaming distracts me from assignments	3.88	Agree
(5) Missed study sessions due to gaming	3.41	Agree
(6) Difficulty concentrating after gaming	3.67	Agree
(7) Physical discomfort (eyes, head, body)	3.53	Agree
(8) Tried but failed to reduce gaming	3.72	Agree
(9) Grades decreased because of gaming	3.45	Agree
(10) Use gaming as a stress escape	3.96	Agree

5. Discussion

This study examined the relationship between mobile game addiction and academic achievement among senior high school students using a convergent mixed-methods design. Quantitative findings revealed a statistically significant

moderate negative relationship between addiction scores and academic performance, suggesting that higher levels of gaming involvement are associated with lower academic outcomes. The qualitative findings provided explanatory depth, revealing that sleep deprivation, physical fatigue, and difficulty regulating gaming behavior contributed to reduced academic engagement. Students acknowledged awareness of negative consequences yet struggled to control gaming behavior, reflecting reinforcement-driven habit formation. These findings align with Cognitive Load Theory (Sweller, 1988), which posits that working memory has limited capacity. Excessive gaming may impose cognitive strain and reduce mental resources available for academic tasks. Furthermore, consistent with Behavioral Reinforcement Theory (Skinner, 1957), reward systems embedded in mobile games may sustain repetitive behavior despite academic consequences. These findings suggest that reinforcement-based digital engagement and cognitive load processes operate simultaneously rather than independently within real classroom contexts. The integration of findings suggests a cyclical mechanism: sleep loss and fatigue weaken self-regulation, increasing reliance on gaming as emotional escape, thereby sustaining academic disengagement.

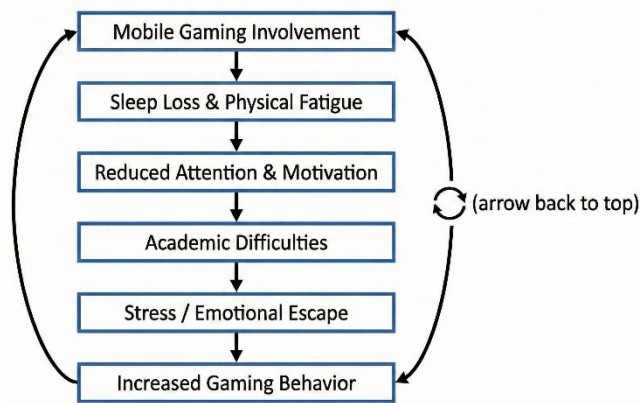


Figure 1. Behavioral cycle of gaming involvement and academic disengagement

The integrated findings indicate a recurring behavioral mechanism in which sleep disruption, cognitive fatigue, and coping-motivated gaming reinforce continued engagement despite academic costs. Rather than reflecting simple time displacement, the findings suggest a self-reinforcing disengagement cycle linking physiological depletion and behavioral reinforcement. This mechanism helps explain why awareness of negative academic consequences does not necessarily translate into effective behavioral regulation among adolescents in classroom contexts.

5.1. Proposed Conceptual Model of Mobile Game Addiction and Academic Disengagement

Based on the integrated quantitative and qualitative findings, Figure 1 presents a conceptual representation derived from the study results. The model illustrates that higher gaming involvement corresponds with sleep loss and physical fatigue, which are associated with reduced academic engagement and motivation. Experiences of academic difficulty are linked with coping-related gaming behavior, forming a recurring pattern of continued gaming and academic disengagement observed among participants.

6. Contribution to the Literature

This study contributes to the growing body of literature on mobile game addiction and academic performance by moving beyond correlational explanations and offering a mechanism-based understanding of why excessive gaming persists despite students' awareness of its negative consequences. While prior research has primarily established statistical associations between gaming behavior and academic outcomes, the present study advances the literature by integrating quantitative evidence with students' lived experiences through a convergent mixed-methods design. By demonstrating how sleep deprivation, cognitive fatigue, and reinforcement-driven self-regulation failure interact to sustain academic disengagement, this study provides a more nuanced explanation of mobile game addiction as a

dynamic behavioral process rather than a simple time-allocation issue. Furthermore, the study contributes context-specific evidence from a Philippine public senior high school setting, addressing a notable gap in existing research that has largely focused on higher education or Western contexts. The integration of Cognitive Load Theory and Behavioral Reinforcement Theory further strengthens the study's contribution by illustrating how cognitive depletion and behavioral reinforcement jointly undermine learning behaviors. Collectively, these contributions offer theoretical, methodological, and practical insights that can inform future research, intervention design, and educational policy related to responsible gaming and student self-regulation.

7. Recommendations

Based on the findings of this study, which demonstrate that mobile game addiction adversely affects students' academic achievement through sleep deprivation, cognitive distraction, and behavioural reinforcement, the following recommendations are proposed for key educational stakeholders.

7.1. For Students

Students are encouraged to develop structured gaming habits that support academic responsibilities. Setting personal limits on daily gaming duration, particularly during school nights, may help reduce sleep disruption and improve classroom attention. Establishing a fixed study-before-gaming routine and using reminders or digital wellbeing tools to monitor screen time can assist in strengthening self-regulation. Students may also benefit from scheduling short breaks, prioritizing academic tasks before recreational gaming, and engaging in alternative stress-management activities such as physical exercise or offline hobbies. Developing awareness of personal gaming triggers and reflecting on gaming patterns can help students align leisure activities with academic goals.

7.2 For Teachers

Teachers play a critical role in early identification and instructional support for students affected by excessive gaming. Indicators such as persistent fatigue, inattention, and incomplete academic tasks may signal problematic gaming behavior. Teachers are encouraged to integrate discussions on digital responsibility, time management, and academic self-monitoring within classroom instruction and homeroom activities, with particular emphasis on helping students translate awareness of gaming-related risks into practical self-regulation strategies. Collaboration with guidance counselors can further support the monitoring of students' learning behaviors and academic engagement.

7.3 For Parents and Guardians

Parents and guardians are encouraged to focus on home routines and role modeling to support healthy technology use. Establishing consistent sleep schedules and maintaining open communication about gaming habits may help reduce excessive use. Rather than solely enforcing restrictions, parents are encouraged to adopt co-regulation approaches, such as jointly setting gaming schedules and reflecting with students on their gaming habits. Modeling balanced technology behavior and promoting meaningful offline activities may help address the gap between students' awareness of the negative effects of excessive gaming and their difficulty in exercising self-control, thereby supporting students' physical, emotional, and social development.

7.4 For School Administrators and Guidance Counselors

School administrators and guidance counselors are encouraged to implement system-level interventions that promote responsible mobile gaming. These may include school-wide digital literacy programs that address the academic and health consequences of excessive gaming. Counseling interventions focused on goal-setting, self-control, and adaptive coping strategies may be particularly beneficial for students who demonstrate awareness of problematic gaming behaviors but experience repeated difficulties in regulating their gaming habits. Schools may also consider institutional policies on mobile device use during instructional time and explore innovative tools such

as voluntary digital self-monitoring applications, game-time reflection logs, or digital well-being contracts to support students' self-regulation skills and academic engagement.

7.5 For Future Researcher

Future studies are encouraged to employ larger and more diverse samples across different schools and geographical contexts to enhance the generalizability of findings. Longitudinal research designs may provide deeper insights into causal relationships and long-term academic outcomes associated with mobile game addiction. Additionally, future research may examine the perspectives of parents and teachers or evaluate the effectiveness of school-based interventions aimed at reducing excessive mobile gaming and improving students' academic performance. Qualitative investigations across multiple schools may further extend the contextual understanding of self-regulation processes related to mobile gaming.

8. Limitations

Despite the strengths of this convergent mixed-methods study, several limitations should be acknowledged. First, the study was conducted within a single public senior high school and involved only one Grade 11 section; therefore, the findings may not represent other schools, educational levels, or regional contexts. Second, the quantitative component relied on self-reported survey data, which may be influenced by response bias, including social desirability and recall effects. Third, the cross-sectional and correlational design does not permit causal conclusions regarding the relationship between mobile game addiction and academic achievement. Finally, although the qualitative interviews provided in-depth insights into students' experiences, the limited number of participants may not capture the full diversity of perspectives among senior high school students. Accordingly, the qualitative component should be understood as providing contextual depth to the quantitative patterns within a bounded setting. Future research addressing these limitations may further strengthen understanding of mobile game addiction as an educational concern. Therefore, the findings should be interpreted as context-bound explanatory insights rather than generalizable population-level estimates.

Declarations

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Competing Interests

None.

Ethical Approval

Ethical standards were strictly observed throughout the mixed-methods research to preserve rights of all participants. Before collecting data, the school principal, research adviser, and concerned teachers gave permission to conduct the study. The researchers provided explicit information about the study's objective, methodology, and scope, and participants were told that their participation was fully voluntary. All respondents provided informed consent, and they were advised that they could decline or withdraw from the study at any moment with no

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Author's Contribution

Bendo¹: Sole Author, Conceptualization, Software, Data curation, Formal analysis, Investigation, Visualization, Methodology, Writing – original draft, Writing – review & editing

Data availability

Preprints.org: <https://doi.org/10.20944/preprints202511.1349.v1>

ICPSR: <https://www.openicpsr.org/openicpsr/project/240362/version/V1/view>

Figshare: <https://doi.org/10.6084/m9.figshare.30631220> and
<https://doi.org/10.6084/m9.figshare.30627335>

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