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# Linkages between Online Game Addiction & Learning Engagement: A study among Indian Medical Students

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**Abstract**

***Objective:*** *Present research work aimed to find out the correlation between medical students' online gaming addiction & their engagement in learning by considering three parameters of learning engagement i.e., cognitive, emotional, and behavioral engagement.*

***Research Methodology:*** *This is an empirical research work which employed quantitative research methods for data collection and its analysis. This study examined correlation between medical students' online gaming addiction and their engagement in learning. This was achieved by employing a structural equation model (SEM) to address the issue of medical students developing addiction to online gaming.*

***Findings:*** *The research model validation results indicate that addiction to online games significantly affects how individuals interact behaviorally, emotionally, and cognitively. The results of this study supported the entire hypothesis i.e., H1, H2 and H3. Therefore, it's concluded that being addicted to online games negatively and profoundly influences all aspects of learning involvement.*

***Originality/Value:*** *The model is predicated on particular variables that affect how online gaming addiction affect learning engagement of medical students. A few of the model's shortcomings need to be filled in and haven't received enough attention in earlier research.*

***Practical Implication:*** *Educators, scholars, guardians, and advisors can all gain from this research by embracing the right perspective on the legitimacy of video games and applying it as a reference when parenting their children. This study is also useful for the medical college management to guide their teachers about how to enhance learning engagement among students who are suffering from online gaming addiction.*

***Key Words:*** *online game addiction, cognitive engagement, emotional engagement, behavioral engagement*

## INTRODUCTION

The world of online gaming in the digital universe sees a yearly increase in its appeal, drawing in many young individuals and adolescents. Lately, the gaming sector has expanded greatly in terms of the number of players and the amount of money made (Basu et al., 2021; Hamadani et al., 2022). According to Shakya et al. (2023) and Basu et al. (2020), the digital gaming industry in India has expanded significantly over the last five years and is expected to surpass the entertainment sector, as Indians spend more time playing games than watching films. The digital gaming industry has grown at a CAGR (compound annual growth rate) of 28% over the past three years. India ranked second globally in fiscal year 2023 with over 42.5 million digital gamers, barely behind China's 75 million gamers. However, India's earnings account for a mere 1.1 percent of the total. Online gaming reached 455 million users in the nation in 2023, up 8% from the year before, and is expected to reach 491 million users by 2024 (Abbas et al., 2024; Untari & Satria, 2022).

The prevalence of problematic gaming habits is a significant public health issue in today's digital era, particularly impacting the younger demographic. While the Internet offers numerous benefits, excessive

use and subsequent internet gaming addiction can lead to uncontrollable and excessive Internet usage, resulting in depression, withdrawal symptoms, and seeking escapism (Gupta et al., 2021; Lin, 2020; Jasiński, 2012). Furthermore, individuals working in the medical field are at higher risk of developing internet gaming addiction and associated mental health issues. Medical students worldwide are five times more likely to experience internet addiction compared to the general population (Basu et al., 2018; Veqar et al., 2020; Bong-Hyun et al., 2024). Many research efforts have examined how addiction to problematic online gaming can affect school grades, showing the wide range of harmful consequences that come with too much focus on digital activities (Manzar et al., 2015; Vainshnav & Dave, 2022). These consequences appear in three main areas: first, often using smartphones while doing homework leads to a stronger negative effect on school grades and achievement; secondly, too much smartphone use and addiction can harm students' skills and mental abilities needed for doing well in school; and thirdly, addiction to online gaming can decrease students' drive to learn (Sobaih et al., 2023; Rolla, 2023). Nonetheless, at present, there exists a shortage of scientifically valid methods for collecting data on online game addiction among college students in India, including the use of big data. It has been recommended that further investigation into how addiction affects students' academic performance is necessary (Gjoneska et al., 2022; Axelson & Flick, 2010; Shakya et al., 2023).

Since the 1990s, engaging in learning has been seen as a beneficial behavior in educational settings in China and Europe and is a significant aspect of research in higher education (Guo et al., 2021). Behavioral, emotional, and cognitive are three important factors of learning engagement (Fredricks et al., 2004; Fredricks & McColskey, 2012). Thus, to investigate the effect of online gaming addiction on learning engagement, researchers need to consider these three elements of learning engagement, especially for the students of medical colleges of India. In this era of advanced academic research, this study aimed to explore the linkages between online gaming addiction among medical college students and their participation in educational activities.

Literature Review In the past few years, the gaming industry has become more popular due to its easy accessibility, especially on mobile devices (Poon et al., 2021). Additionally, quicker and more budget-friendly high-speed internet is becoming more available, helping to grow the online gaming industry (Desai et al., 2024). Internet gaming disorder (IGD) is increasingly acknowledged as a potential mental health issue associated with major issues or distress. The global prevalence of IGD ranges from 0.8% to 30%, according to a thorough study, indicating that younger people and males face a much higher risk (Lin, 2020; Hawi & Samaha, 2017). India's vast number of young people and adolescents, along with the nation's rapidly expanding smartphone industry and increasing Internet access, position them especially at risk for all types of tech dependency (Poon et al., 2021; Abbas et al., 2024). Online gaming, in particular, poses a higher risk of addiction due to its blend of Internet's addictive traits with multiplayer features, which promote online friendships on gaming communities and provide a diversion from real life (Stanković et al., 2022). In contrast to conventional gaming, online gaming is more prone to addiction as it merges the Internet's addictive elements with multiplayer features, which encourage online friendships on gaming communities and offer a break from reality (Blasi et al., 2019; Hamadani et al., 2022). Furthermore, similar to gambling, which is recognized by the American Psychological Association as the only technology and behavior-related disorder that has been certified, IGD can lead to a loss of control, intense cravings, and a strong desire to engage in the activity despite its detrimental effects on one's health and general well-being (Gjoneska et al., 2022; Sun, Sun, & Ye, 2023). Excessive online gaming has become a serious mental health concern, despite the ability to improve well-being and daily life. This highlights the risks associated with excessive online activity (Rotenstein et al., 2016; Eynon & Malmberg, 2011).

Prolonged study sessions, emotional stress, and a heavy workload might produce an environment that is conducive to mental health concerns, including severe depressive symptoms, for medical students. As a result, internet gaming addiction has a complex impact on a person's physical and mental health,

interfering with their day-to-day activities (Zaman et al., 2022; Sun et al., 2023). Consequently, a person's physical and mental well-being is significantly affected by an addiction to online gaming, which leaves a lasting effect on their daily life (Anderson, Steen & Stavropoulos, 2017; Teng et al., 2021). Adolescents who engage in video games more often or for extended durations on a regular basis are at a higher risk of becoming addicted to gaming. However, individuals with higher levels of education are at a lower risk of addiction. Moreover, the amount of time teenagers spend playing video games and the severity of their addiction to online gaming have both increased sharply during the COVID-19 pandemic (Guo et al., 2021; Lin, 2020; Teng et al., 2021). Active learning has been a major topic of research in higher education since the 1990s when it was viewed as a desirable educational technique in both Europe and the US (Axelson & Flick, 2010). Three components make up learning engagement, according to Fredricks et al. (2004): behavioral, emotional, and cognitive. Behavioral engagement involves participation in the learning process and active participation in school-related activities (Kahu & Nelson, 2018; Basu et al., 2018). How students feel about their course material and the classroom environment is known as emotional involvement. This encompasses the emotional responses that students have to their studies, such as their interest or lack thereof in learning during class activities (Kanat, 2019; Kahu & Nelson, 2018; Finn et al., 1995), and their feelings toward their teachers, fellow students, and the general school climate. Cognitive engagement is linked to internal processes such as thorough thinking, the utilization of cognitive strategies, managing oneself, commitment to learning, critical thinking, and drawing connections in daily life (Kuh et al., 2007). Mental engagement indicates a student's dedication to studying and their implementation of methods or self-discipline. Choi et al. (2021) define learning engagement as the social interaction, behavioral vigor, emotional attributes, and use of cognitive strategies by students in their learning activities. According to Chen & Zhao (2024), learning engagement serves as a significant gauge of students' academic advancement and is a pivotal milestone in their educational journey. It is crucial for enhancing the academic performance of college students and the quality of education. The motivation to achieve is an essential part of students' desire to learn (Zhang et al., 2018; Han & Lu, 2018). It is the underlying factor that drives individuals to invest effort in activities they consider valuable and significant for the purpose of accomplishing a specific goal (Han & Lu, 2018). Additionally, children's participation in learning is positively impacted by a harmonious parent-child relationship (Han & Lu, 2018). Furthermore, Shao et al. (2022) demonstrated that unsatisfactory parent-child connections had a detrimental effect on adolescents' motivation for academic accomplishment. They also concluded that medical students who had low motivation for academic achievement were more likely to be mobile phone and online games addicts. Therefore, parental support is necessary to increase students' engagement in their education.

## AIM OF STUDY

Present research work aimed to find out the correlation between medical students' online gaming addiction & their engagement in learning by considering three parameters of learning engagement i.e., cognitive, emotional, and behavioral engagement.

## HYPOTHESIZED MODEL

Previous studies on learning engagement have often focused on it as a concept with one or two aspects, showing a preference for the aspect of behavioral engagement (Demir & Kutlu, 2020). Yet, dimensions that were previously ignored like emotional and cognitive engagement are also crucial parts of learning engagement. In a concept with multiple dimensions, the various elements of each dimension together form a unified whole. The diagram of the research model is presented in Figure 1.

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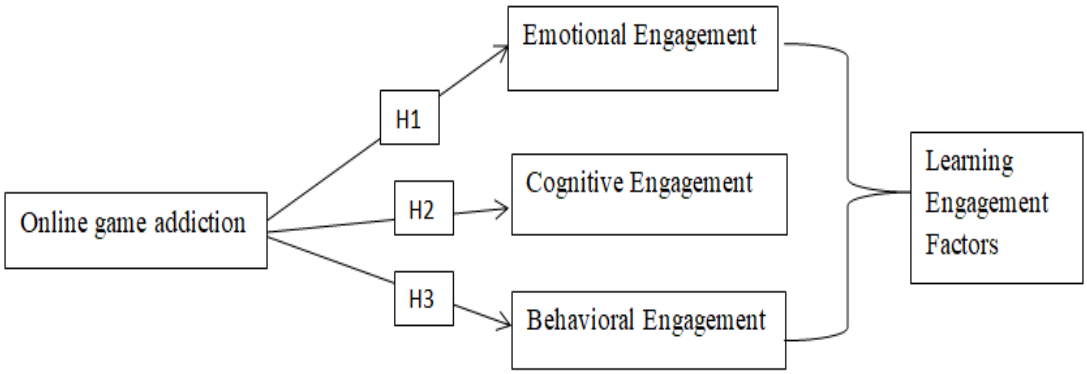


**Figure 1:** Research Model

***Source:*** Fredricks et al. (2004)

## HYPOTHESIS DEVELOPMENT

Previous research has viewed the idea of student involvement in learning as a complex one. Finn (1995) put forth the participation-identification model to direct studies on how involved students are in their education. According to Demir & Kutlu (2020), a dynamic and satisfying mental state connected to the learning process is student involvement in the process. Based on earlier research, Chapman (2019) highlighted the use of emotional, behavioral, and cognitive signals to assess students' learning engagement. Previous studies (Chapman 2019; Shao et al., 2022) have pinpointed certain criteria for gaming addiction, including the disregard for other activities, a reduction in interest in past hobbies, and the possible effect on work and social relationships as a result of gaming. Both intrinsic and extrinsic motivation for learning are adversely affected by addiction to short videos and online games. Additionally, addiction to cell phones has a serious impact on students' academic performance, commitment, and ability to foster relationships, all of which are closely linked to their academic success. Pan et al., (2022) have indicated that the time spent by medical students playing video games and browsing the Internet can have detrimental effects on their cognitive abilities. College students' addiction to their phones, particularly through social media and gaming, has been shown to negatively impact their learning engagement. The study of Chen & Zhao, (2024) and Choi et al., (2021) highlighted how gaming addiction can reduce college students' participation in their studies. As a result, three research hypotheses were formulated.

**H1:** There exists a negative association between online game addiction and emotional learning engagement.

**H2:** There exists a negative association between online game addiction and cognitive learning engagement.

**H3:** There exists a negative association between online game addiction and behavioural learning engagement.

## RESEARCH METHODOLOGY

Several medical and dental students from various medical institutions in Maharashtra, India, took part in the study between December 2022 and February 2023. The empirical investigation was conducted in both private and public medical colleges. The study included students ranging from first-year to final-year students.

## RESEARCH TOOL

Utilizing quantitative research techniques, the current empirical study employed a questionnaire-based survey for data collection. The questionnaire items were modified based on earlier research findings by Fredricks et al. (2004). The Likert 5-point scale (which spans from strongly disagree to strongly agree) was

used. Following the collection of the questionnaire, item analysis was carried out to determine whether the scale met the requirements. This was followed by reliability and validity analysis of the questionnaire constructs using SPSS 20. Finally, IBM AMOS Ver. 20 was used to validate the research model.

**Demographic Profile and Commonly played games**

In this research, authors distributed online questionnaires through Google Forms. Before sending these surveys to the students, researchers obtained the necessary permissions from the appropriate medical colleges. We used an easy-to-reach sampling method to select participants, which included medical college students who willingly chose to take part. Questionnaires were circulated among 870 medical students out of which 793 responses were received but 33 responses were incomplete. Thus 760 responses were considered for the final analysis. Men participants were 44.21% (336) out of the total participants, whereas women made up 55.78% (424). The majority of the participants were in the age range of 20-21 years. In the student group, 67.36% (512) were pursuing the undergraduate medical (MBBS) program, and 32.63% (248) were studying the undergraduate dentistry (BDS) program. Out of all the students, 77.89% (592) were involved in playing online games.

**Online Game Addiction and Learning Engagement Scales:**

In our research, authors explored the issue of college students developing an addiction to online games, including both mobile and internet gaming. The scale used to assess the addiction was adapted from Xiang et al. (2024) and its items were tailored accordingly. This adaptation led to the creation of a scale consisting of ten items. The authors incorporated the three aspects of learning engagement—behavioural, emotional, and cognitive—by observing how students actively participated in their academic pursuits. Adhering to its theoretical framework, the authors adjusted the learning engagement measure developed by Choi et al., (2021), resulting in a 23-item scale that covers behavioural, emotional, and cognitive engagement.

**RESULTS**

In this research work, confirmatory factor analysis (CFA) has been performed to validate all items of the constructs. CFA is used to check construct validity (Hafiz and Shaari, 2013). Further, in this study, the reliability of the questionnaire was examined through Cronbach's α metric. It is required to check the internal consistency of the data. Hair et al. (2021) have provided the standard value of composite reliability (CR) which should be more than 0.70 and the values of Cronbach's α should also be more than 0.70.

In the present research work, Cronbach's α scores were found between 0.88 and 0.94. The CR scores were also found between 0.89 and 0.94, as presented in Table 1. Factor loading should be greater than 0.50, as recommended by Rai et al., (2021) and Hair et al. (2021), and items with factor loadings less than 0.50 ought to be removed. Furthermore, to check the convergent validity, Average variance extracted (AVE) values ought to be greater than 0.50. The constructs in this investigation showed AVE values between 0.58 and 0.80 and factor loading values between 0.63 and 0.91. As seen in Table 1, every dimension satisfied the suggested standards.

**Table 1:** Reliability and Validity of Factors

| Constructs | Mean (M) | Standard Deviation (σ) | Cronbach's (α) | factor loading (FL) | composite reliability (CR) | average variance extracted (AVE) |
|---|---|---|---|---|---|---|
| OGA | 1.79 | 0.89 | 0.88 | 0.69- 0.79 | 0.89 | 0.58 |
| EE | 3.71 | 0.88 | 0.93 | 0.81- 0.88 | 0.94 | 0.80 |
| CE | 3.91 | 0.91 | 0.94 | 0.81-0.91 | 0.90 | 0.79 |
| BE | 3.99 | 0.88 | 0.89 | 0.63- 0.86 | 0.89 | 0.66 |

***Source:*** Authors' calculation

Where,

OGA: Online Game Addiction

EE: Emotional Engagement

CE: Cognitive Engagement

BE: Behavioral Engagement

Based on research by Hair et al. (2021) and Rai & Gupta (2021), for a construct's (latent variable's) square root of the average variance extracted (AVE) to be effective, it must surpass its correlation coefficients with other constructs for optimal discriminant validity. Table 2 illustrates that the concepts of online game addiction and learning engagement demonstrate robust discriminant validity, as indicated by the findings of the current study. Usually, Pearson's correlation coefficient is used to determine how closely two variables are related. Strong relationships between variables are indicated by a correlation coefficient of 0.7, moderate relationships are shown by values between 0.3 and 0.7, and weak relationships are indicated by values below 0.3. The results of the discriminant analysis (correlation analysis) are shown in Table 2. An association was found between online game addiction and behavioral engagement ($r = -0.39$, $p < 0.001$), emotional engagement ($r = -0.41$, $p < 0.001$), and cognitive engagement ($r = -0.39$, $p < 0.001$) that was slightly negative. There was a moderate positive association between behavioral engagement and emotional engagement ($r = 0.58$, $p < 0.001$), a moderate positive correlation between behavioral engagement and cognitive engagement ($r = 0.54$, $p < 0.001$), and a moderate positive correlation between cognitive engagement and emotional engagement ($r = 0.67$, $p < 0.001$).

**Table 2:** Results of Discriminant Validity (Correlations among Latent Constructs)

| Constructs | OGA | EE | CE | BE |
|---|---|---|---|---|
| OGA | 0.81 | | | |
| EE | −0.41 | 0.79 | | |
| CE | −0.39 | 0.67 | 0.81 | |
| BE | −0.39 | 0.58 | 0.54 | 0.61 |

***Source:*** Authors' calculation

## PATH ANALYSIS RESULTS

The research discovered that being addicted to online games significantly negatively affected how much people were involved in their activities ($\beta = -0.369$; $p = 0.009$). Moreover, the study showed that being addicted to online games significantly negatively influenced how emotionally involved people were ($\beta = -0.491$; $p = 0.003$). Additionally, it was noted that being addicted to online games significantly negatively impacted how mentally involved people were ($\beta = -0.441$; $p = 0.010$). Any p-values below 0.05 were deemed significant as shown in Table 3 and Figure 2.

**Table 3:** Path Analysis Results

| Path of Constructs | ***β*** **(Beta Co-efficient)** | p-value | Hypothesis Decision |
|---|---|---|---|
| OGA-> EE | −0.491 | 0.003 | Supported |
| OGA-> CE | −0.441 | 0.010 | Supported |
| OGA-> BE | −0.369 | 0.009 | Supported |

***Source:*** Authors' calculation

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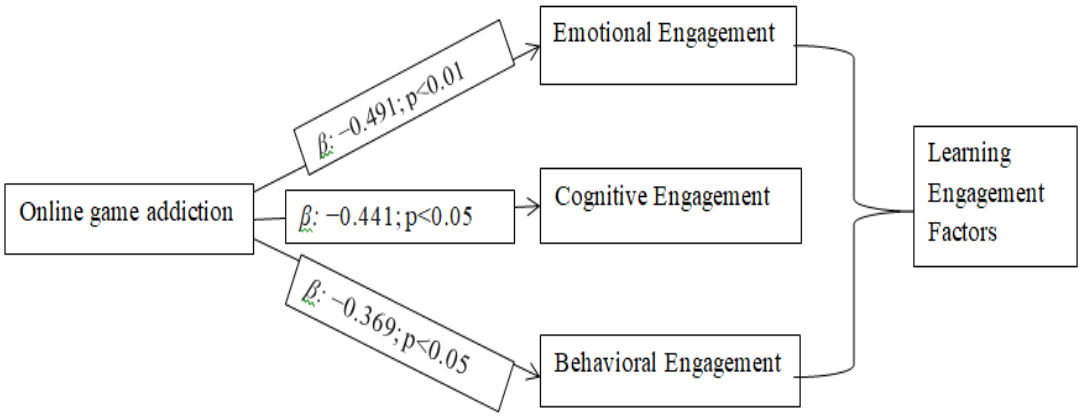


**Figure 2:** Path Analysis Results

***Source:*** Authors' Own

**Model Fit Indices**

Hafiz and Shaari, (2013) have outlined that for a model's fitness analysis to be valid, it must meet the following criteria: the root mean square error of approximation (RMSEA) must not surpass 0.10; normed fit index (NFI), comparative fit index (CFI), the goodness of fit index (GFI) and adjusted goodness of fit index (AGFI) must all be above 0.80. In the present study, all the model fit indices were found above the standard values i.e., $\chi 2/df$ = 3.291, GFI = 0.902, CFI = 0.911, RMSEA = 0.069, AGFI = 0.900, NFI = 0.901. The results met the expectations, indicating that the model functioned well in the present study (Table 4).

**Table 4:** Model Fit Indices

| Model Fitess | Values |
|---|---|
| $\chi 2/df$ | 3.291 |
| RMSEA | 0.069 |
| GFI | 0.902 |
| AGFI | 0.900 |
| NFI | 0.901 |
| CFI | 0.911 |

***Source:*** Authors' calculation

## DISCUSSION

The academic performance of students in their studies frequently suffers due to a dependency on video game addiction. Hawi & Samaha, (2017) discovered that the wrong way of using short videos can damage students' involvement in class activities, which is related to their emotional and mental involvement. Pan (2022) pointed out the negative relationship between students' addiction to online games and their approach to learning, as well as their grades. The prevalence of internet gaming addiction among college students can be significantly reduced through the involvement of both families and educational institutions. A primary factor driving college students towards online gaming is likely their limited knowledge of alternative activities for leisure and their dependence on these platforms as a means of relaxation (Chapman, 2019).

According to research by Demir and Kutlu (2020), students' motivation to learn is negatively impacted by playing online games too much. Students' capacity for effective communication decreased as their addiction to online games increased. Furthermore, Chen & Zhao (2024) emphasized a detrimental relationship between online game addiction and students' attitudes toward learning as well as the quality of their relationships with peers.

The research model validation results indicate that addiction to online games significantly affects how individuals interact behaviorally, emotionally, and cognitively. The results of this study supported the entire hypothesis i.e., H1, H2 and H3. Therefore, it's concluded that being addicted to online games negatively and profoundly influences all aspects of learning involvement. This research encompassed addiction to both PC and mobile games, categorizing them all as online game addiction. The results align with Guo et al. (2021), Choi (2021), and Zhang et al. (2018), who highlighted that addiction to cell phones adversely impacts the involvement of college students in their academic pursuits.

## CONCLUSION

The rising incidence of excessive internet gaming among medical students in college is currently a source of great concern. The relationship between excessive online gaming, academic engagement, and decreasing drive to succeed in school requires more research. Using structural equation modelling (SEM), this study sought to examine how these three parameters were related to one another. According to the findings, excessive online gaming has three detrimental effects on students' engagement—its first is on behavior; the second is on emotional health; and the third is on cognitive health. The study's conclusions make it clear that students' addiction to online gaming might hinder their academic performance, leading to a decline in their behavioral, emotional, and cognitive involvement. The level of academic excellence in higher education is significantly influenced by the active participation of students in their learning. The introduction of educational technology has disrupted conventional teaching methods. The COVID-19 pandemic has accelerated this shift. The impact of the COVID-19 crisis and the stress associated with it played a role in how the growth mindset of medical college students influences their engagement in learning (Demir and Kutlu, 2020). Moreover, the presence of medical students in social settings and their ability to manage their learning independently positively affect their involvement in online learning Hawi & Samaha, (2017). The involvement of students in learning is enhanced by their positive views of their teachers (Choi, 2021). Furthermore, their engagement in learning is increased by their perception of the support provided by their instructors (Zhang et al., 2018). Medical colleges should therefore support their students in developing healthy interests and hobbies and enrich their after-school activities. Teachers in medical colleges ought to concentrate on providing care and support to their students during the teaching and learning process. Active interventions can often have an impact on students' academic achievement motivation. According to Pan (2022), students are motivated to learn because their feeling of self-efficacy increases as a result of their accumulating experiences of achievement.

## LIMITATION OF STUDY AND FUTURE SCOPE

The present study is limited to online gaming addiction among medical students only. Further, medical students of only Maharashtra medical colleges participated in this study whereas the level of gaming addiction could differ among students of another state. Additionally, only three parameters of learning engagement i.e., emotional engagement, behavioral engagement and cognitive engagement included in this study whereas some other factors like self-efficacy, family environment, and peer support could also be considered for the same. Previous research on how online game addiction affects student performance has primarily relied on quantitative methods. However, when analyzing the problem of online game addiction among medical students, it's critical to recognize the importance of qualitative study. Through gathering detailed, factual information through qualitative methods like interviews, researchers can gain a deeper insight into students' true perspectives on gaming and the psychological aspects of addiction. As a result, future research should consider incorporating more qualitative research methods to explore the topic of online game addiction further.

## PRACTICAL IMPLICATION

Educators, scholars, guardians, and advisors can all gain from this research by embracing the right perspective on the legitimacy of video games and applying it as a reference when parenting their children. This study is also useful for medical college management to guide their teachers about how to enhance learning engagement among students who are suffering from online gaming addiction. Medical colleges

should not allow students to use mobile phones during college time until it is required for learning material.

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**Authors' contributions**
The author contributed toward data analysis, drafting and revising the paper and agreed to be responsible for all the aspects of this work.

**Declaration of Conflicts of Interests**
The author declares that there is no conflict of interest.

**Availability of data and materials**
Not Applicable

**Use of Artificial Intelligence**
Not applicable

**Declarations**
The author declares that all works are original and this manuscript has not been published in any other journal.

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