THE IMPACT OF VIDEO GAME ADDICTION ON SLEEP DISORDER AMONG ADOLESCENTS AND YOUNG ADULTS: A SYSTEMATIC REVIEW

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ABSTRACT

Purpose: *Although playing games can benefit players' mental health and intellect, its detrimental effects often develop parallel. This article examined the link between online game addiction and sleep disturbances for adolescents and youngsters.*

Design/methodology/approach: *We used the Priority Reporting Section to get a systematic review and use Meta-analysis with PRISMA guidelines to analyze reports. To do so, we searched all the related literature in six electronic databases comprising EBSCO, PubMed, Scopus, Science Direct, Web of Science, and JSTOR to detect papers available before March 22, 2021. We selected seven papers out of 1047 articles that matched our research criteria through a systematic review. The quality of the selected papers was assessed by using the criticisms set in Joanna Briggs Institute.*

Findings: *Our findings confirmed a positive relationship between gaming addiction and sleep disorders. The prevalence of addiction to video games from the association fluctuated from 1.9% to 10%.*

Implications and Discussions: Our study had theoretical and strategic implications for the stakeholders in raising awareness of monitoring behaviors related to video game addiction and sleep disorders.

Originality: *With many young people playing video games, we can easily meet video game addicts around us. This paper contributes to affirming that a sign of recognizing game addiction is a sleep disorder in young people. The paper could also influence the directions for future studies on sleep disorders or addiction theories.*

Keywords: Video Game Addiction, Sleep Disorders, Systematic Review, Corporate Culture, Labor Management.

JEL Classification: I1 Health, I12 Health Behavior, M14 Corporate Culture, M54 Labor Management.

INTRODUCTION

The gaming industry has been overgrowing in recent years in terms of both gamers and revenue. Millennials (aged 23 to 38) are the leading generation in owning and using electronic technology equipment and internet service (Vogels, 2019). There has been an increase in video gamers in recent years, from 2.3 billion in 2018 to 2.7 billion by 2020 (Wijman, 2018, Wijman, 2020). At the same time, video game revenue brought in a significant increase, from $ 137.9 billion in 2018 to $ 159.3 billion in revenue in 2020 (Wijman, 2018, Wijman, 2020). During a coronavirus

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outbreak, everyone was recommended as restricted from going out and should stay at home. Indoor activities at home like playing a video game become a valuable recreational game during lockdowns. Therefore, the prevalence of playing video games due to the coronavirus pandemic accounts for 25%, 29%, 33%, respectively, in Germany, United Kingdom, the United States by 2020 (Kunst, 2020).

Video games can benefit youth in promoting well-being and preventing and treating mental health problems (Granic et al., 2014). The amount of grey matter in the brain increases for game players, enhancing brain connectivity, so video games could be employed to combat risk factors for mental illness (Kühn et al., 2014). Intellectual and social skills could have better in young children who play video games than non-gaming people (Bolton, 2016). Physically active video games are favorable for older adult's health and people with neurocognitive impairments (Stanmore et al., 2017). Regular use of active video games can positively affect mental health and physical performance (Santos et al., 2021).

However, playing online games was potentially addictive for those who spend too much time on them. Generation Z led mobile gaming, with 47% of members playing mobile games from 11 to 30 minutes at a time (Freer, 2020). Younger people, especially men, were more likely to suffer from gaming disorders than older people (Mihara and Higuchi, 2017). Furthermore, gaming disorder was recognized as an official behavioral addiction and mental health disorder by the World Health Organization in the 11th Revision of the International Classification of Diseases (Pontes et al., 2021). Internet game addicts got significantly lower gray matter density than the healthy controls (Lin et al., 2015). The dopamine release of game addicts is like drug abusers (Weinstein et al., 2017). Since young people are the primary labor force in a country, it is imperative to take care of their physical and mental health. Thus, game players need to be aware of the usefulness and harm to adjust reasonably the game time, especially those who stay at home to prevent the pandemic (King et al., 2020).

Various investigations about video game addiction indicated different mental health impacts. The more time pre-adolescents and adolescent students spent playing video games, the more likely they were to be addicted to video games (Esposito et al., 2020). A small number of people who play video games excessively lead to negative consequences, such as decreasing work performance or study efficiency (Männikkö et al., 2015, Király et al., 2018). Disorder gamers manifested at the highest degree of inappropriate personality traits and psychotic symptoms (Musetti et al., 2019). Problematic video game players negatively affected psychological performance, such as psychological symptoms, emotion, coping ability, and self-esteem (Heiden et al., 2019). There was a connection between video game addiction and anxiety, depression, attention deficit hyperactivity disorder, social phobia, and inadequate psychosocial support (González-Bueso et al., 2018).

Insufficient sleep means getting less sleep than needed, which is considered a serious health risk due to negative mood, attention, and academic performance (Owens, 2014). Game addicts have poor health compared to non-addicted people (Beranuy et al., 2020). Using electronic media in bed before bed can cause teenager's sleeping trouble and sleep disturbances (Lemola et al., 2015). The consequence of problematic internet usage can be poor sleep quality (An et al., 2014). Additionally, lack of sleep has been linked to hyperglycemia in young adults, adolescents, and children (Toyoura et al., 2020). Thus, the intensity of video gaming could become a predictor of sleep quality (Altintas et al., 2019). The risk of depression, cognitive performance, mood, metabolism, and obesity are related to sleep duration (Kansagra, 2020).

Video game addiction positively relates to depression, anxiety, and stress (Moge and Romano, 2020, González-Bueso et al., 2018). Meanwhile, sleep disorders can build up the relative

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risk of suicidal attempts and intentions (Pigeon et al., 2012). Furthermore, symptoms of insomnia or poor sleep quality are correlated with suicidal risks (Bernert et al., 2015). Therefore, this study systematically looked at existing literature to explore the link between Internet Gaming Disorder (IGD) and sleep disturbance in adolescents and young adults. This study's two research questions are: (1) What is the prevalence of online game addiction among adolescents and young adults aged 12-39? (2) Is there an association between playing online games and sleeping disorders among adolescents and young adults?

DATA AND METHODOLOGY

Data

The Study Collection Criteria

Selected articles for analysis relevant to the purpose of the study have criteria such as quantitative non-interventional research designs, peer-review journals reported in English, 12-39 aged participants. Besides, the included articles have examined the association between gaming addiction and sleeping disorders. In contrast, many criteria exclude papers unsuitable for research topics, such as experimental design, editorials, proceeding letters, conference abstracts, non-peer-reviewed papers, literature review, and systematic review. Two authors individualistically studied all reports based on the included and excluded criteria, title, and abstract to identify eligible articles for full-text review. The third author rechecked and reviewed the selected documents.

Data Extraction and Synthesis

The authors utilized the critical evaluation checklist from the Joanna Briggs Institute (JBI) for evaluating the research quality (JBI, 2021). JBI's essential assessment checklist provides eight questions for cross-sectional research. Each answer on the list is graded 1 or 0 for "yes" or "ambiguous or not applicable or no," respectively. Reviewers must deliberate any difference to make a concluding decision. Meanwhile, the Kappa statistics and percentage agreements are designed to assess consistency among reviewers regarding study selection and quality evaluation. Still, the Kappa value should be 0.8 or higher to demonstrate an excellent arrangement (Giannantonio, 2008). Thus, the authors calculated the Kappa statistics and percentage agreements to analyze the approval with SPSS 25.0 software.

All article citations related to the topic in the searching process were saved to Endnote software. Then, the authors use the find duplicate tool to exclude duplicate papers. The articles were then extracted to an excel file for convenience testing, comparing with research paper standards, and discussion among reviewers. An author did data extraction and cross-checked it with a different author for all typical articles such as age, gender, sample size, publication year, study design, titles, study country, the relevance of the included article content to the research topic. Reviewers reached a consensus via the discussion upon any discrepancies while selecting the final articles for analysis.

Methodology

Research data uses an advanced online database search engine, with keywords in search based on article analysis criteria as PRISMA's guidelines, the Preferred Reporting Items for Systematic Reviews and Meta-analyses (Moher et al., 2009). PRISMA is a powerful tool to assist authors in improving systematic reviews, summarizing, and analyzing details of previous studies

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related to research objectives. The authors had to study 27 listed items (PRISMA, 2020) and develop a four-stage plan for processing and refining the related research literature (Moher et al., 2009). The authors used many keywords to reach the objectives, based on the flexible PICO (Problem/Patient/Population, Intervention /Indicator, Comparison, Outcome) framed study problem (N.Y.U. Libraries, 2020; Schardt et al., 2007). The keyword of the patient (P) was student OR adolescent OR youth OR teenager. The keyword of problems (P) was online game addiction OR internet game addiction. The keywords that described impacts of the issues were (Sleep disturbance OR Sleep Problems OR sleep disorder)) AND (Depression OR Anxiety). Hence, the synthesized keyword phrase in the PubMed database was (((Student OR Adolescent OR Youth OR Teenager) AND (Online game addiction OR internet game addiction)) AND (Sleep disturbance OR Sleep Problems OR sleep disorder)) AND (Depression OR Anxiety). Formerly, step by step searched for keywords on the advanced search engines on March 22, 2021, from six databases, including EBSCO (2020), PubMed (2009-2021), Scopus (2008-2021), ScienceDirect (2000-2021), Web of Science (2020), and JSTOR (2002-2019).

CONTENT ANALYSIS AND RESULTS

Included Articles

The authors collected all 1124 articles compiled and screened in the period 2002-2021 as described in the PRISMA chart, of which 1 article from EBSCO, seven articles from PubMed, two articles from Web of Science, 828 articles from Scopus, 243 articles from ScienceDirect, 40 articles from JSTOR. After removing the articles through the duplicate function from the Endnote program and study selection criteria, seven articles were selected for the overall analysis, details in Figure 1. The agreement between two separate authors for this study selection was exceptional for abstract and title (Kappa = 0.553, percent consensus = 99.2%) and chosen papers (percent agreement = 88%). After discussions, the authors agreed to select seven papers, and the consensus of the two reviewers rated the quality as excellent (percent agreement = 100%), presented in Table 2.

PRISMA 2009 Flow Diagram

The study of online game addiction, sleeping disorders, depression for undergraduate students

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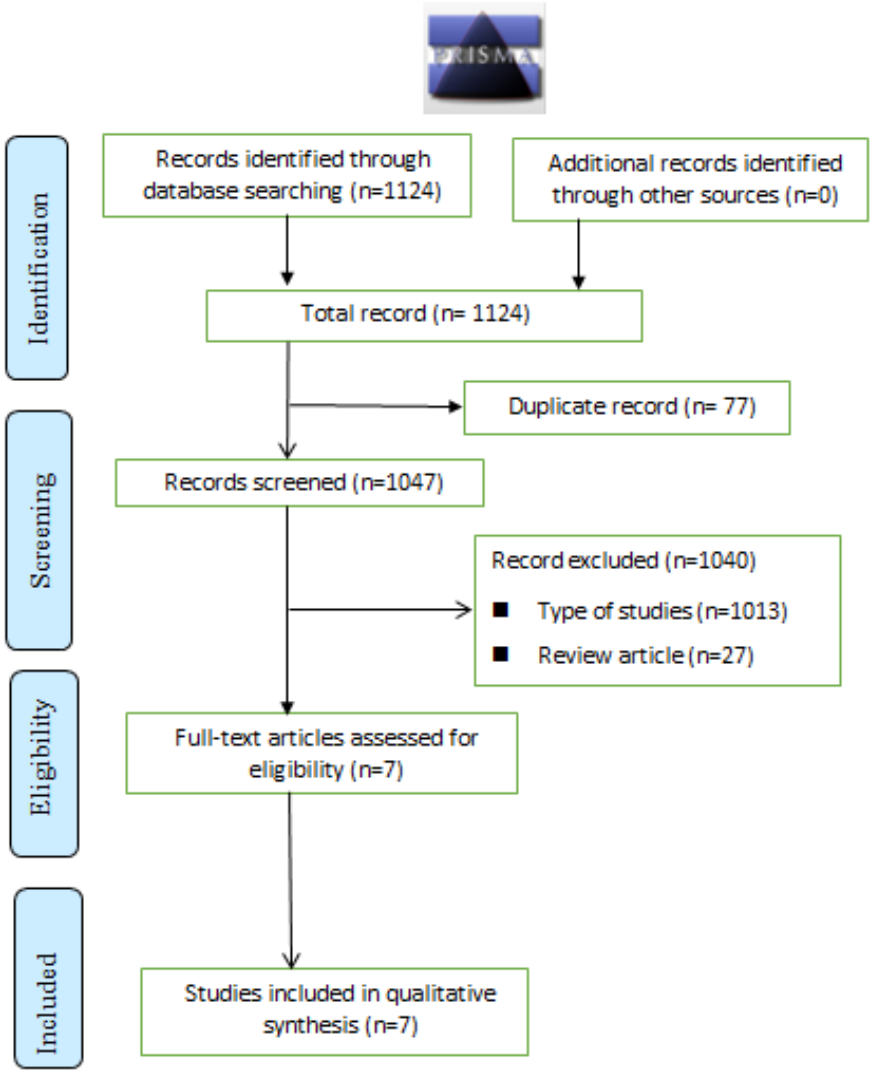

FIGURE 1
PRISMA FLOW CHART

Study characteristics

Seven full-text papers are eligible and selected. In addition, the authors have chosen the participants who are adolescents and young adults aged from 12 to 39. The sample size was from 293 to 43003 participants. The number of male respondents was more prominent than that of females, excluding two studies (Hawi *et al.*, 2018) and (Stevens *et al.*, 2020). Cross-sectional was the dominant research method of selected articles. The participants from the included research were from Finland, Italy, Lebanon, the United States, and Iran. All selected papers were published in English and reputable journals from 2015 to 2021, including examining the association between video game addiction and mental health problems. The characteristics and summary of the included articles are presented in Table 1.

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Table 1
SUMMARY OF SELECTED STUDIES

No	Author, year	Country	Study design (cohort, cross-sectional, case-control	Sample size	Gender	Measures for video game addiction	Measures for sleeping problems or depression, or mental health problems	Association between video game addiction and mental health problems	Prevalence of video game addiction
1	Männikkö et al., 2015	Finland	cross-sectional	293 respondents aged 13 - 24	Male 51%; Female 49%	Gaming Addiction Scale (GAS)	The School Health Promotion study, indicating psychological and physical symptoms	Problematic gaming behavior has been linked to health and psychological issues such as fatigue, sleep disturbance, symptoms of depression and anxiety.	4.30%
2	Canale et al., 2019	Italy	cross-sectional	605 participants (Mean age 24.01 years)	Males = 82%; Females 18%	The Internet Gaming Disorder Scale Short Form (IGD9-SF)	The Perceived Stress Scale (PSS); the 10-item Resilience Scale (RS-10)	Perceived stress related to higher scores of IGD, whereas psychological resilience was correlated to lower scores of IGD.	1.90%
3	De Pasquale et al., 2020	Italy	cross-sectional	566 young Italian adults	Males 57,2%; Females 42,8%	The Internet Gaming Disorder Scale Short Form (IGD9-SF)	The Symptom Checklist-90 Revised (SCL-90 R)	The data exhibited a positive association between online game use and depression, anxiety, and psychosis levels.	5.30%
4	Hawi et al., 2020	Lebanon	cross-sectional	524 high-school students	Males 47.9%; Females 52.1%	The Internet Gaming Disorder Test (IGD-20 Test), self-report	The Internet Gaming Disorder Test (IGD-20 Test), self-report	IGD related to being younger, lesser sleep, and lower academic achievement.	9.20%
5	Stevens et al., 2020	United States	cross-sectional	43003 undergraduates	Male 29.7%; Female 67.9%; another gender 2.5%	Internet use and computer gaming were inquired as part of a more extensive list of potential problems that could affect student performance	The participant's report assessed 11 mental health behaviors and feelings related to mood, including three specific behaviors for self-harm and suicide.	Problematic internet use/computer gaming represents a significant correlate of mental health symptomatology.	10%
6	Fazeli et al., 2020	Iran	cross-sectional	1512 adolescents	Males 56.4%; Females 43.6%	The Internet Gaming Disorder Scale Short Form (IGD9-SF)	Depression, Anxiety, and Stress Scale-21 (DASS-21)	Depression, anxiety, and stress mediates the association between IGD and insomnia.	7.31%

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7	Lin et al., 2021	Iran	cross-sectional	320 adolescent students and their siblings	Males 52.8%; Females 47.2%	The Internet Gaming Disorder Scale Short Form (IGD9-SF)	The Depression Anxiety Stress Scale-21 (DASS-21), and the Insomnia Severity Index (ISI)	Adolescent students and their siblings bore mutual effects of IGD on psychological health and sleep.	7.22%

Table 2
METHODOLOGICAL QUALITY OF INCLUDED STUDIES

Joanna Briggs Institute checklists	Männikkö et al., 2015	Canale et al., 2019	De Pasquale et al., 2020	Hawi et al., 2020	Stevens at al., 2020	Fazeli et al., 2020	Lin et al., 2021
Were the criteria for inclusion in the sample clearly defined?	1	1	1	1	1	1	1
Were the study subjects and the setting described in detail?	1	1	1	1	1	1	1
Was the exposure measured in a valid and reliable way?	1	1	1	1	1	1	1
Were objective, standard criteria used for measurement of the condition?	1	1	1	1	1	1	1
Were confounding factors identified?	1	1	1	1	1	1	1
Were strategies to deal with confounding factors stated?	1	1	1	1	1	1	1
Were the outcomes measured validly and reliably?	1	1	1	1	1	1	1
Was appropriate statistical analysis used?	1	1	1	1	1	1	1

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Prevalence and Measures of Video Game Addiction

Table 1 shows the prevalence of video game addiction in Europe (Italy, Finland), Asia (Lebanon, Iran), and America (United States). The proportion of adolescents and young adults addicted to video gaming in Europe (1.9% - 5.3%) is the lowest, compared to Asia (7.22% - 9.2%) or America (10%). For example, the rate of video game addiction in Italy was 1.9% of the 605 participants (Canale et al., 2019) and 5.3% of the 566 young adults (De Pasquale et al., 2020). Additionally, that portion in Iran is 7.31% (Fazeli et al., 2020) and 7.22% (Lin et al., 2021), while the portion in Lebanon is 9.2% (Hawi et al., 2018). Finally, the prevalence in the United States is 10% of 43,003 undergraduate students (Stevens et al., 2020). Although the proportion of video game addiction is low, with an estimated 2 billion or higher individuals playing video games, the number of people addicted to video games is remarkable (Tsukayama, 2018).

There are three approaches to measuring video game addiction in the included studies. The short form of Internet gaming disorder score (IGD9-SF) is a standard measurement in gaming addiction studies because the authors of the five included articles used this method in their research (Canale et al., 2019, De Pasquale et al., 2020, Fazeli et al., 2020, Lin et al., 2021, Hawi et al., 2018). Besides, the Game addiction scale measured video game addiction in Finland (Männikkö et al., 2015). In the United States, internet usage and computer gaming are listed in the answers to the questionnaire to measure academic performance (Stevens et al., 2020).

Measures of Sleeping or Depression or Mental Disorder

Several methods have been manipulated to measure sleep disorders, depression, or psychiatric disorders. The School Health Promotion study estimated psychological and physical symptoms for the participants in Finland (Männikkö et al., 2015). Depression, Anxiety, and Stress Scale- 21 (DASS-21) is exploited for the study in Italy and Iran to assess the mental health behavior and feelings related to a mood (Lin et al., 2021, Fazeli et al., 2020). In the United States, a questionnaire for participant's self-report, including 11 mental health behaviors and feelings related to mood, and five frequency options adopted for testing mental health symptoms (Stevens et al., 2020). Likewise, the Symptom Checklist-90 Revised questionnaire evaluates respondent's psychopathology in Italy (De Pasquale et al., 2020). In Italy, the 10-item Resilience Scale assesses Psychological resilience, and the Perceived Stress Scale (PSS) measures life events that are appraised as stressful (Canale et al., 2019). Similarly, the Internet Gaming Disorder Test (IGD-20 Test) expresses nine IGD criteria in the DSM-5 that assess the relationship between scale score and game time (Hawi et al., 2018).

The Association between Video Game Addiction and Sleeping Disorders or Depression or Mental Health Problems.

Several articles have studied both video game addiction and sleep disorder, depression, or mental health. First, problematic gaming behavior has been linked to health, sleep disturbance, symptoms of depression, and anxiety (Männikkö et al., 2015, Stevens et al., 2020). Second, the study affirmed a positive association between video game addiction and depression, sleep disturbance, and psychosis (Canale et al., 2019, Pasquale et al., 2020, Fazeli et al., 2020, Hawi et al., 2018, Lin et al., 2021). Therefore, it is possible to determine the effects of mental disorders such as sleep disorders or depression on game addicts.

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IMPLICATIONS AND DISCUSSIONS

The Theoretical Implications

The study contributes to behavioral or managerial theories involved in understanding video game addicts and sleep disorders. The number of people playing games increases, and the percentage of people addicted to games are trending up. For an employee training program, young people spending a lot of time on video games will likely reduce investment return in training. Instead, young people with sleep disturbances, poor job performance, and atypical mood disorders should be questioned about video games because gamers often sacrifice sleep duration to maintain a video game schedule (Eickhoff et al., 2015). Moreover, individuals with sleep disturbances are more likely to lose focus while driving than drivers without sleep disturbances and increase the likelihood of a collision or near-crash (Bharadwaj et al., 2021). Manifestations of young people addicted to games are sleep disorders, lack of sleep, daytime sleepiness, so managers need to ask about the insomnia of young people. If young employees show signs of game addiction, leaders need to provide advice or company rules to self-regulate their behavior.

The study contributes to organizational behavior theories of building a corporate culture in a company that needs to care about sleep disorders or game addiction in young employees. The epidemic pushes companies to accelerate the process of digitization and automation to integrate into industry 4.0. Undeniably, leadership and motivation play a crucial role in corporate culture (Košičiarová et al., 2021), and the company's culture partially affects its value (Park et al., 2021). The vital factors influencing the organizational innovation process are customer orientation, corporate culture, and leadership style (Fan et al., 2021). Meanwhile, peer education interventions can enhance sleep quality and lessen depression and anxiety (Ding and Yao, 2021). Academic motivation and success in school can decrease the risk of problematic smartphone routines (Fischer-Grote et al., 2019). Hence, adjusting the behavior of young employees with company rules or employee training is critical because the more time spent on education, the more time the video game declines (Esposito et al., 2020).

The Strategy Implications

The study contributes to warning the health of game addicts, so game makers need to pay attention to player's health to develop a sustainable entertainment industry. Social media marketing from game manufacturers must be associated with customer relationship activities to care about the customer's mood or health. Additionally, digital marketing strategies in the video game industry should aim for healthy games for learning or job performance. Thus, the game time reminder should be written while the gamers are playing. If they spend too much time playing games, that can affect poor health.

Cognitive-behavioral therapy (CBT) is a practical psychotherapeutic approach for monitoring and treating addiction symptoms for certain patients (Yau and Potenza, 2015). Cognitive disorder in Internet gaming can be associated with persistent overestimating rewards, activities, and identities in video games. Thus, clinical research programs should identify mental individuals with Internet gaming disorder and provide a good strategy for expanding and improving cognitive therapies. CBT for IGD is still effective in lessening IGD symptoms and depression (Christ et al., 2020; M. W. R. Stevens et al., 2019). CBT is a promising approach for the short-term treatment of internet and gaming addictions (Wölfling et al., 2019). Though, expert opinion in the field recommended additional clinical trials to advance the assessment of IGD symptoms (Zajac et al., 2020).

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Since commercial games are a great teaching tool for high school students (Rüth and Kaspar, 2021), family influence is decisive for adolescents or young adults in controlling game behaviors. Therefore, family care and supervision could assist young people in evolving problematic gaming actions (Zhu et al., 2021). Parental control and self-regulation are required to limit the time and duration of video gameplay to remedy adverse effects (Fischer-Grote et al., 2019). The paternal connection may be protective against gaming problems, so interventions for adolescents may be more effective in problematic gaming in any case if parents actively cooperate (Schneider et al., 2017). Thus, leaders should collaborate with employee families for monitoring employee routines because family supportive supervisory behaviors are particularly imperative in improving employee sleep quality (Sianoja et al., 2020).

In the coronavirus pandemic, leaders must innovate the administration to effectively manage employee's work, especially those who work from home. A conceptual model for overcoming the COVID-19 pandemic crisis and employee motivation is suggested (Haque, 2021). The proportion of working from home has increased significantly during the outbreak (Mlitz, 2021). However, worker's physical and mental health declined after working from home due to distractions while working, adjusted work hours, communication with coworkers, physical exercise, and food intake (Xiao et al., 2021). In addition, game addicts often sacrifice sleep time to play games (Eickhoff et al., 2015), which will make their health poorer and worse. Furthermore, managers need to monitor the health of young people when they work from home. At the same time, giving helpful advice is necessary for those who lack sleep owing to spending too much time playing games.

CONCLUSIONS

The study gave an overview of the association between video game addiction and sleep disorders. At present, the game industry is growing in revenue and profit every year and attracting many young people or teenagers - the number of game players increases in recent years. Therefore, the latest studies indicated the game addiction rate ranges from 1.9% to 10%, depending on the research area. Many of their adverse effects and sleep disturbances in game addicts have been put forward and analyzed. In addition, the above issues should be resolved by many stakeholders to have the most suitable overall solution.

The study is a wake-up call for those who play games with symptoms of insomnia. The popular indoor recreational activity is gaming because, during the pandemic, authorities asked their citizens to stay at home and only go out when necessary. Thus, it is a faster-than-normal increase in people playing games during a pandemic. Meanwhile, gaming brings both positive and negative things in terms of physical and mental health. Sleep disorders are closely linked with people addicted to games. Lack of sleep will make physical and mental health decline over time. Therefore, sacrificing sleep time to play games makes physical and psychological health reduce. The solutions treating sleep deprivation and game addiction must be researched and discussed soon, especially for young people, due to the popularity of information and communications technology and the increasing internet speed.

Those solutions for the above problem should come from government regulations, physicians, managers, parents, and the players themselves. First, government regulations should introduce soon to reduce the adverse risk of gaming owing to the continuing increase in people playing games. Policies for game development will affect many players and game makers because the number of people playing games today is so large. Therefore, consistent policies are necessary, in line with the direction of a healthy and rewarding environment for today's thriving gaming industry. Second, physicians should ask about the patient's game duration when treating sleep

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deprivation and insomnia to offer appropriate solutions and therapy. Third, managers should hire young employees who love what they do.

Consequently, when they come up with policies to promote practical work, these people will respond enthusiastically. Simultaneously, when working effectively, other concerns such as spending time playing games will be secondary options. Fourth, the role of parents is significant in controlling playtime and the type of game that is appropriate for the health and cognition of these teenagers and young people. The control of teenagers playing games should be based on family connections. Finally, game players themselves must be aware of the risk of game addiction and insomnia, thereby adjusting their behavior accordingly. Gamers should limit the amount of time they play each day. At the same time, other activities should be scheduled every day, including exercise. Pursuing an alternative hobby replacing gaming is an effective way to reduce game time and prevent game addiction.

This article uses the Priority Reporting Section to get a systematic review and uses Meta-analysis with PRISMA guidelines to examine the link between online game addiction and sleep disturbances for adolescents and youngsters. Extension of our paper could include using our approach to analyze other interesting issues, for example, the exchange rate (Batai et al., 2017), capital structure (Chang et al., 2019), education (Hau et al., 2019, 2020; Nguyen et al., 2020; Tuong et al., 2021; Tuan et al., 2019), tourism (Thipwong et al., 2020a,b); sustainability (Tran et al., 2019), and many others. Academics and practitioners could apply our approach to study many important topics in economics and finance, for example, Wong (2020, 2021) for more information.

The future study may deliberate the following limitations in this study. First, the paper reviewed only seven studies regarding the connection between video game addiction and sleep disorders. In addition, there is a language bias because the authors solely evaluate peer-reviewed and English studies. Furthermore, study design limitations, methodology, sample size, and outcome measures may cause different interpretations in future studies. Finally, inclusion studies have been performed in a limited number of countries from Asia, Europe, and the Americas, so the results from these studies may not be universally applicable. Future research related to video game addiction should examine the level of sleep disorders among the participants. In addition, the solutions to this problem should be discussed thoroughly among the stakeholders.

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