

Signs, mechanisms and consequences of videogame addictions: educational strategies and rehabilitation

Giusi Antonia Toto¹ and Pierpaolo Limone¹

¹ Learning Science Hub, University of Foggia, Arpi Street 176, Foggia, 71122, Italy

Abstract

The topic of video game addiction has garnered significant attention in research over the years. It involves excessive gaming using electronic devices, leading to interferences with daily life activities. In the last decade, many empirical studies have analyzed the origin of video games and video game addiction. However, it remains unclear if video game addiction meets the criteria of mental disorders; therefore, further research on this topic is required. According to some studies, the addiction is based on scientific facts and media hysteria. There are many misconceptions and beliefs concerning video games; for instance, some people perceive video games as beneficial, while others believe that they are harmful. Video game addiction can be determined by investigating the time spent playing and an individual's perception of the games. In this context, this paper first presents the history of video gaming and its benefits and then analyzes the cause, effects, and consequences of video game addiction. Afterward, it examines the educational and rehabilitative strategies used to help remedy video game addiction.

Keywords

Video Game; Video Game Addiction; Educational Strategies; Rehabilitation Strategies; Brain; Dopamine, Reward.

1. Introduction

From the origin of computers, people have found ways to play games on them. Video games are automated games that connect with a user interface such as a controller, console, or joystick to generate a visual response. The response is displayed on devices such as monitors, televisions, and touchscreens. Most video games are connected with audio feedback provided by headsets or speakers. Video games can be defined depending on their podiums; for instance, there are individual computer games, console plays, and arcade video games. In recent years, the video

¹ Proceedings of the Third Workshop on Technology Enhanced Learning Environments for Blended Education, June 10–11, 2022, Vieste, Italy
EMAIL: giusi.toto@unifg.it (A. 1); pierpaolo.limone@unifg.it (A. 2)
ORCID: 0000-0001-5538-5858 (A. 1); 0000-0003-3852-4005 (A. 2)

game sector has extended into moveable gaming through smartphones, remote cloud gaming, virtual systems, and tablet computers. Ultimately, video games are categorized into different types depending on their purpose and gameplay.

Playing video games can be relaxing and offers an individual an opportunity to exert control. According to research, video games have health, social, and learning effects on people [1]. Playing video games is a phenomenon ubiquitous in most children and teenagers, with 90 percent playing every hour [2]. Moreover, the number of video games purchased every day is increasing. Hence, the government has warned against the risk of addiction to the games and their unavoidable connection to aggression and conflicts. As time progresses, the rates of depression among kids and teenagers will rise significantly if they are not educated on the effects of gaming addiction.

2. Video Games

2.1 History of Video Games

Video games can be dated back to the 1950 and 60s [3] when computer experts started structuring modest games and models on their computers and processors. William Higinbotham's most resounding influence in the world was the first atomic bomb created at Los Alamos research laboratory. Subsequently, he became a foremost symbol in the atomic non-proliferation program; for example, he was the creator and president of the Federation of American Scientists. In his role in pivotal global events, Higinbotham developed the first video game. During this period, Higinbotham realized his work could be a game-changer for visitors and the whole world [4]. He spent numerous hours designing the basic tennis replication by applying analog computer technology created to track missile trajectories and combining 5-inch oscilloscope displays. *Tennis for Two* was a widespread feature for guests; hence, the milestone for video games began. However, other prototypes could be referred to as video games that are never referenced anywhere, including *Tic Tac Toe*, developed by Alexander Douglas in 1952, or the OXO, a simulation of a pencil-paper play called *Noughts and Crosses*.

According to Ivory [4], OXO should be considered the first video game despite lacking a display. Another effort was made by Christopher Strachey in 1951 when he created *The Draughts*, which pioneered the artificial intelligence program. However, *Tennis for Two* and other earlier games were never released commercially or played widely, and they were created as working prototypes or displayed on secluded occasions. The first video game to be released to a significant number of users was the game *Spacewar!* that was developed by students of the Massachusetts Institute of Technology in 1962 [4]. The game endorsed two actors to regulate contesting spaceships and try to fire one another with torpedoes while circling a mysterious hole. *Spacewar!* used a cathode ray tube display and custom-designed controllers on digital equipment corporation PDP-1 computer. It used digital computer hardware, and it was the first video game to be commercialized. *Galaxy Game* from Stanford University in California was a coin-operated video game in 1971, while *Computer Space* was released the same year in America. Although the technologies used to make the initial video games differed, conceptual themes were common in all early games.

The primary video games were entrenched in mimicking subjects of competitive corporations, from board plays to sports and war [4]. The mass-produced commercial arcade game by Atari Inc. met commercial success and was well-received at Andy Capp's Tavern. *Pong* featured the same theme as *Tennis for Two*, hence upholding the concept of simulating competitive actions. In 1972, the video game console called Magnavox Odyssey was featured in sports and shooting games. It applied light indications joined with overlaps positioned on the user's television displays to

replicate graphics and included game and action playoffs. Ultimately, the rise of personal computer ownership in the 1980s and the rise of computer games promoted the evolution of video games.

Ivory [4] argues that the advancement in visuals from the initial video games permitted sport and combat simulations to offer a way to improve subjects in *Pac-Man Super* and *Mario Brothers*. In this regard, *Pac-Man* had contributed to the second video game industry crash in 1983, with the first crash in 1977. Nintendo led to the recovery of the video game business; however, the home console has continued to wear away the arcade video game market. The original handheld video game console was developed in 1990 by Nintendo.

The improvement in microchip technology conveyed two significant expertise changes involving the start of visual media via CD-ROMs and simultaneous 3D polygonal explicit representation. These two features were included in individual computers and formed a market for graphics cards. The internet had accessed the broad market by late 1990; hence, video games began including online features. Microsoft joined the console hardware marketplace in the 2000s with the Xbox line.

Nintendo focused on advanced gameplay and created the Wii with signal-detecting controls, which aided in drawing non-traditional gamers and assisted or resecured its' position in the gaming business [4].

Sony released PlayStation 2 (PS2), and it was the first console to support DVD format. Nintendo produced the game cube in 2001, the first console to apply optical discs configured for the structure. Microsoft developed DirectX to normalize game hardware interfaces for windows-based computers and used the same method to craft the Xbox in 2001. Overall, PS2 continued to lead and remains the best home console. Sony, Nintendo, and Microsoft have become the main players in the console hardware sector. In 2005, Microsoft produced the Xbox 360, Sony produced the PS3 in 2006, and Nintendo produced the Wii.

As the Internet spread, many people turned to online games. Massively multiplayer online introduced great games such as *EverQuest*, *RuneScape*, *Ultima Online*, *World of Warcraft*, and *Second Life*. Due to Internet connectivity issues, role-playing games become harder to produce; hence, establishing a large subscription society to validate the development expenses is difficult [5]. First, esports competitions started in the 2000s, and by 2010, various global esports contests had been set up across the various game categories. Augmented reality games involve real-time video game images and offer additional graphics. PlayStation console games utilized a PlayStation camera or *EyeToy* as part of the game.

The augmented reality plays launched with the release of *Pokemon Go* in 2016, which combines site-based games with augmented reality. As technology advances, more improvements have been made in the game industry with high resolutions and frame rates. In 2020, the metaverse concept grew rapidly and employed advanced technology to generate immersive worlds for social and economic purposes.

2.2 Benefits of Video Games

- Cognitive Remediation: Video games have assisted in cognitive remediation in conceptual thinking, concentration, attention, visual plasticity, memory, mental rotation, creativity computation, perceptual disorders, processing speed, language difficulties, fluid intelligence, executive functioning, and performance. According to Griffiths [6], video games have shown successful reintegration plans to develop constant consideration for patients with attentional challenges, Down syndrome, or craniocerebral trauma. Furthermore, research demonstrates that video games have therapeutic benefits for older adults, making them active and improving their intellectual and memory capacities.

- **Video Games as Distractors:** Most video games have been used as a distraction that helps block pain and negative thoughts. The perception is that distractor tasks take some concept of attentional ability dedicated to pain perception and negative thinking [6]. Video games engage the individual's active attention, allow the possibility to accomplish sustained attainment, and appeal to most teenagers and kids. Additionally, such games have been used as distractor tasks to prevent people from fidgeting or biting nails. More importantly, during cancer therapies, video games have successfully offered cognitive distraction for kids, adolescents, and some adults, and such distraction lowers the number of painkillers required during chemotherapy.
- **Occupational and Physiotherapy:** Most video games have been utilized as a form of occupational therapy. Studies illustrate how repetitive exercises can be boring to people recovering from physical challenges. When video games are introduced into therapy, they have therapeutic effects on patients. For example, a patient using video games can innovatively correct finger and hand motions, thus increasing function and strength while reducing arm and shoulder injuries. According to Griffiths [6], a video game can be used as a workout program to enable the rehabilitation of upper-limb injury fatalities; for instance, this can be achieved by using different joysticks. This technique helps patients overcome the initial stage—which they often resist—while encouraging hand movement and hence reaching the desired performance. Ultimately, video games can be used in different settings to motivate patients and help them succeed in their treatment and therapies [7].
- **Health Compliance:** Healthcare providers have used video games to transform participants' behavior in a lively manner. Research indicates that kids and teenagers demonstrate improved self-care and lowered use of crisis facilities after engaging in healthy and illness management video games. For instance, *Packy & Marlon* has been used for diabetes self-care and *Rex Ronan* for smoking deterrence [6]. Most participants adopt the main role of a personality in these interactive games, which helps them have the strength to push through. Most young individuals engaged in video games have smoking-free lifestyles. Furthermore, research shows that adolescents with HIV/AIDS have increased self-efficacy in the prevention programs after engaging in video games. Overall, video games have been highly useful in health promotion in young adults.
- **Emotion and Anxiety Control:** Playing video games can aid in recuperation from anxiety and stress. The therapeutic application of video games has resulted in reduced anxiety and stress with anxiety-related problems taking a new path. Preoperative anxiety in kids is reduced as a result of their active engagement in video games [8]. Moreover, military personnel have demonstrated improved protective mechanisms and coping skills after participating in video games. Furthermore, video games have been used in palliate contexts and therapy through simulations to treat clinical diseases.
- **Physical Activity:** Video games have been applied in an exergaming context that involves using electronic games as physical exercise. In this regard, exergaming has shown a decrease in body mass index and weight. Studies report that mobile gaming promotes physical activity. Playing video games involves body movements, causing moderate physical activities and energy use. According to Griffiths [6] individuals who engage in video games have positive results related to weight loss; hence, exergames enhance physical activity.

2.3 Video game addiction

It is great when people engage in activities or games they enjoy best; however, when an activity is performed excessively, it can negatively impact an individual. Gaming has existed for over 50 years, but research indicates that its harm is still in the early stages.

According to Triberti et al. [9], different scholars have diverse conclusions about video game

addiction. Video gaming is widely known as an activity with addictive effects; in this regard, the analysis of the Internet gaming disorder has been highlighted in the DSM-5 and ICD11, and more discussions on particular characteristics of the illness are still underway. Notably, time spent playing is a key factor in the addiction issue. Video game addiction is a challenging, obsessive use of electronic plays that causes substantial damage to a person's capacity to operate properly in different life spheres over a long time [10].

Due to the controversy created within the scientific, gaming, and medical societies, video game addiction, and other related concepts have been undergoing research and debate.

According to Mahews, Morrell & Molle [11], this disorder is analyzed according to an individual ability to engage in gaming events at the expense of their everyday activities or responsibilities without caring about the negative effects. The American Psychiatric Association (APA) does not view video gaming addiction as a condition but perceives it as a disorder that requires more study in the DSM-5. Overall, video game addiction involves excessive Internet gaming habits [10]; hence it is linked to internet addiction as the outcomes of video games are comparable to those of projected mental infatuations. This dependence includes an impulse control disorder related to compulsive gambling; thus, the APA explains why it can be proposed as a disorder. Most players are more concerned with their game interactions than their other life activities; hence, they spend much more time playing than engaging in personal duties. Triberti et al. [9] argue that most players have disrupted sleep patterns, lose or gain weight, and have poor hygiene, resulting in sleep deprivation, avoiding friends, and often lying about their activities.

The APA structured nine criteria to characterize the Internet gaming disorder to assess the addiction [10]. In this regard, the association considers the following: preoccupation, withdrawal signs, tolerance ability, the need to reduce or stop playing, giving up on other activities, continuing playing despite challenges, cover-ups, escaping adverse emotions, and risk of losing opportunities or relationships. Various pieces of equipment are used to analyze the addiction; however, the survey on problematic video game-playing was demonstrated as a computable degree, not a pinpointing instrument. Mathew, Morrell & Molle [11] argue that all addictions are constantly about reinforcement and rewards, claiming they have six constituents: conflict, withdrawal, salience, relapse, and mood modification. Most of the APA criteria try to abbreviate the analytical work on diagnosing gaming disorders. Furthermore, the world health organization has listed video game addiction in the international statistical classification of disease and associated health issues (ICD-11). Overall, various factors promote video game addiction related to different activities in the society to which people commit [12].

2.4 The Controversy of Video Game Addiction

In every American home, at least one individual plays video games often. Some people will deny that they are addicted to the game while claiming they play it more often. However, it is unclear how video games become an addiction; hence, the APA has categorized the Internet gaming disorder as a possible unconfirmed diagnosis that requires more study [13]. A study conducted in 2017 suggested that the categorization can cause change someday. The APA also proposed that there is insufficient research to establish excessive gaming as an addiction. Another scientific skepticism indicates that only a few gamers display signs of the disorder, particularly symptoms of tolerance and withdrawal; hence, scientists consider that misuse of video games is a custom or sign of a prevalent condition, not an addiction.

2.5 Stages of Addiction

When one starts gaming, it becomes hard to stop. The lack of unanimity within the scientific and medical sector concerning the classification of gaming addiction with no consensus on the stages of the condition's development makes it challenging to understand video game addiction. Every addiction case is unique and involves a different game; thus, each one manifests differently [14]. However, generally, the stages are as follows:

- Initial stage: this involves prompt involvement with gaming, during which pleasure and appeal with electronic games grow swiftly.
- Deeper interest: an individual gaming activity starts to consume a spot of great implication in the player's life, sometimes consuming time and necessitating a proliferating venture in hardware and software. Other actions start to have low significance in the outcome.
- Growing obsession: video games occupy a major role in a person's life, with their opinions progressively becoming uniquely directed towards playing and other related activities. At this point, relationships start to be avoided as the individual spends most of their time gaming.
- Full-blown stage: video games become an individual's major activity or sole interest. Their entire free time goes to gaming, and their energies are focused on it sometimes at the expense of other life aspects such as education or careers. At this stage, sleeping patterns and diet are greatly affected, and most players are isolated from their friends and family.

2.6 Types of Video game Addictions

Generally, video game addiction manifests in two types. Standard electronic games are structured to be played by an individual player and include a clear objective. Thus, most people get addicted when trying to accomplish the mission of obtaining a high score. The second type of addiction is linked to online multiplayer games. According to Gros et al. [8] this type of gaming can be addictive as they have no limit, and gamers will keep playing, creating an online character. Most people will build connections with other players to avoid life realities. Moreover, most video games are premeditated to be addictive by applying state-of-the-art developmental sensibility to retain an individual's connection. These video games are immersive, providing a person with high dopamine levels, and overexposure to dopamine can lead to structural transformation in an individual's brain. A person can engage in gaming activities for many hours without realizing it [11]. At times, gaming offers an environment where one feels safe while escaping measurable anxiety and stress from real-life situations.

2.7 Causes of Video Game Addiction

Electronic games are becoming increasingly popular in the contemporary world, and they target certain individuals of different ages. According to Baturay & Toker [15] video games contain addictive elements of excitement and rivalry that make them popular recreational programs for adolescents and kids; hence, they will do anything to reach higher levels within the games. Research indicates that many people struggling with video game addiction symptoms play multiplayer games on the Internet. In this regard, massively multiplayer online role-playing games can be addictive as they provide endless adventures full of fantasy, allowing players to live different lifestyles as new individuals. These games offer a chance to escape reality and leave behind the challenges of real life. Additionally, people tend to feel appreciated, useful, and welcome in in-game environments [15]. Like sports players, video game players are united; they join clubs, make friends, help each other, and develop status. The context of all this can be virtual, but the connection becomes real as time progresses. Most players want to be part of something

and play a certain role that makes them feel meaningful. This often occurs when an individual does not have social gratification; hence, playing video games becomes the core of their social life and strengthens their self-esteem.

Common factors that contribute to video game addiction include the following [16]:

- Low self-esteem
- Loneliness
- Anxiety
- Social isolation
- Feelings of being neglected
- Lack of empathy
- Depression
- An aggressive personality
- Managing moods through computer games

2.8 Signs and Symptoms

Signs. Most video game addictions start early in adolescence [17]. Warning signs include the following:

- Spending most hours playing games
- Reduced productivity (job or education-related performance)
- Choosing games over socializing or sleep
- Deceiving or being secretive about gaming habits
- Avoiding other activities to play more

Symptoms. Video game addiction symptoms can be categorized into two classes: emotional and physical symptoms [17]. When an individual spends many hours playing a video game, it may indicate addiction. It is also noteworthy that if a person plays video games to feel happy, it could be an indicator of addiction as well. Withdrawal symptoms include fatigue, insomnia, headaches, intense cravings, and aggressive emotions. Video games affect the brain in a manner similar to drug abuse, triggering dopamine release, which reinforces the behavior in return. The following two sections describe the emotional and physical symptoms that an individual addicted to video gaming might display.

Emotional symptoms include the following:

- Isolating from social groups or family
- Lying about the games
- Preoccupation with thoughts of earlier gaming activity
- Irritability when not able to play
- Restlessness

Physical symptoms include:

- Poor personal hygiene
- Migraines due to immense focus or eye strain
- Fatigue
- Carpal tunnel syndrome due to rot overuse of computer

2.9 Mechanism of Addiction

Despite the extensive research conducted on video game addiction since the 1980s, its

mechanism is not well recognized because of the varying descriptions provided [11]. Some theories emphasize that the alleged built-in reward schemes of the games like force loops are possibly addictive. The expectation of the rewards forms a neurological response that releases dopamine into the body; hence, when the reward is achieved, the player will recall it as an enjoyable sensation. This reaction is similar to drug abuse and gambling addictions; however, it is not of the same intensity and has some diversities. Griffiths [6] claims that online video games are addictive as they can be played anywhere and daily. Players get absorbed into the game and find it hard to stop, thus playing for several hours straight. Excessive video gaming affects the brain areas accountable for the reward system, sensor-motor coordination, and impulse control.

In this sense, structural evaluations illustrated that alterations in the ventral striatum volume hypothetically caused fluctuations in the brain's reward system, and players addicted to video gaming exhibit faulty inhibitory control and reward mechanisms. Gaming is linked with dopamine release of a magnitude similar to that in drug use and betting. The exhibition of playing images triggers brain areas in a manner similar to drug addicts [8]. Treatment studies that monitored brain connectivity adaptations demonstrated a decline in the action of the areas connected with longings. However, evidence indicates that gaming addiction may occur by the same neural mechanism of causal drug use: video game addiction lowers the thoughtfulness of the dopaminergic reward system. However, it is untimely to determine that video game addiction has similar effects to drug addiction as the studies are still in the initial stages [10].

Other research has indicated challenges in decision-making in particular settings such as risky conditions and high choices for temporary rewards. The amount of neuroimaging research on Internet gaming is increasing, and several procedural challenges are prevalent, especially in psychometric assessment inconsistency. Some scholars proposed that gaming addiction occurs from mental health issues; hence, it is uncertain if video game addiction should be viewed as an exceptional diagnosis.

2.10 Effects of Video Game Addiction

Video games are fast becoming part of the culture and are ranked as a major entertainment sector worldwide, and most video games have been associated with teenagers. The following are effects linked to video game addiction:

- **Poor Sleeping Patterns:** Sleep is essential and critical for every human being. Each sleep stage serves as initial easing to face a temporary state of muscle paralysis in stage 1 and stage 5. The sleep-wake cycle is a complicated procedure that requires an immense connection between diverse neurotransmitters. While a video game can be entertaining, its adverse impact on other life factors should not be neglected. In this regard, studies indicate that video gamers are prone to poor sleeping patterns as they spend more time playing instead [18]. When the sleep pattern is affected, the quality of life is reduced as sleep efficiency is lowered, especially in the case of playing games before bed. Video gaming during bedtime delays sleep onset and interferes with sleep duration and efficiency, and disrupting sleep time negatively affects sleep patterns.
- **Depression:** Depression has been acknowledged as a source and consequence of video gaming addiction. It can leave a person indifferent and disheartened concerning their future, lowering the significance of hard work or education aspirations in their minds. At the same time, it raises the appeal of inconsequential but rapidly gratifying activities such as video gaming. The resulting loneliness and isolation from the social world increase the chance of falling into depression. Most people turn to video gaming due to loneliness or social isolation. In return, engaging in video games for long hours can prolong depression and its effects. Furthermore, addiction to games contributes to anxiety, low self-esteem, and depression in the players, thus

affecting them physically and psychologically. Overall, according to King & Delfabbro [17], excessive gaming can lead to mental health issues such as depression.

- **Financial Constraints:** Most gamers spend money purchasing video games, thus risking financial problems. Video games featuring microtransactions can cause high bills totaling thousands if the gamer does not control their expenditures. Most people have been rendered bankrupt due to their spending and reliance on money-hungry games. According to Peracchia & Curcio [18] the gaming industry offers about 261.4 billion dollars to the economy, which indicates that a significant number of people spend considerable money on gaming. The high consumer funding can be an economic advantage; however, the consumers may face financial challenges.
- **Health Issues:** Video game addiction can cause health disorders that develop within a short period. Moreover, when gamers move into extreme addiction, they can suffer insomnia and develop eye problems. According to Baturay & Toker [15] video game addicts have poor cognitive functioning and psychological health. Furthermore, video gaming has also contributed to obesity as most players spend their time seated and dedicate little to no time for physical exercise; thus, most gamers are likely to become overweight. Notably, studies indicate that adults and young people who engage in excessive video gaming have high blood pressure and heart rate due to stress and too much excitement.

3. Strategies to Solve Video Game Addiction

Due to technological advancement, more attention has shifted to video games as entertainment. Studies have demonstrated that several strategies can help solve the addiction. In this regard, this article focuses on educational and rehabilitative strategies to remedy video gaming addiction.

3.1 Educational Strategies

- **Set Time Limit:** One way to reduce gaming time is to set a time limit. Enforcing healthy time limits helps remedy some of the negative effects of video gaming addiction. By doing so, the individual will have enough time to concentrate on important life aspects such as careers or academics. Moreover, limiting gaming time helps people utilize their free time to keep fit rather than gaming all the time. It can also allow individuals enough time to go out and socialize, hence avoiding health disorders such as depression resulting from loneliness and isolation. In this regard, the government can implement time-limiting policies to help reduce the amount of time spent on gaming. For instance, South Korea adopted a law in 2011 prohibiting people under the age of 16 from playing electronic games during nighttime. Thus, players will be forced to take some time off the screen.
- **Redesign the Environment:** Quitting video games is not easy; nonetheless, making the environment inconvenient will facilitate controlling gaming habits. By doing so, individuals can stop purchasing more games or uninstall them from their computers or mobile phones, and gaming accounts can be deleted and everything unplugged. In this sense, redesigning the setting involves changing or getting anything related to video gaming. Studies report that when an environment does not have gaming elements, it will be hard for an individual to engage in video game activities. According to Derevensky et al. [20], reinventing the environment can help minimize gaming effects while enabling an individual to partake in responsible gaming habits.
- **Keeping Electronic Gadgets Away:** Many people might think this is easy, but it can be hard with the increased need for mobile or computer gadgets. In particular, video game addicts can be advised to keep electronics away from their bedrooms when they go to sleep. This will help them focus on sleeping rather than being distracted by electronics. Good sleep patterns are

essential to every individual's physical and psychological health. Peracchia & Curcio [18] argue that good sleep patterns improve the quality of life. Moreover, individuals can keep their electronics away to prevent them from playing video games excessively and allow them to engage in other useful activities.

- Encourage Physical Activity: With the increase in Internet use, challenges related to excessive use have increased. Video game addiction can induce neurobiological changes; however, its effects can be eliminated through engaging in exercise [11]. To reduce video game addiction, an individual may be encouraged to participate in physical activities such as sports or the gym. Most of these activities are included in the school curriculum; hence, encouraging teenagers and kids to participate in such activities in their schools is highly beneficial. According to Gros et al. [8], physical activity helps gamers reduce the risk of injury and stress levels due to isolation and sitting for prolonged hours.

3.2 Rehabilitative Strategies

Similar to any other addiction, video game addiction can lead an individual to become more dependent on the source and display aggressive behavior if they cannot access it. Therefore, similar to any other form of rehabilitation, acceptance is the first step to overcoming behavioral addiction. Regardless of the addiction severity, behavior, and the re-occurring effect of the psychiatric condition, video gaming disorders can be treated. However, total abstinence from the Internet and video gaming can be hard in this contemporary world [21].

Nonetheless, a balanced approach toward Internet use can be realistic through rehabilitation and proper treatment. Treating video game addiction focuses on behavioral transformation approaches and therapies.

- Cognitive-Behavioral Therapy: This common rehabilitation strategy guides addicts away from obsessive habits or thoughts. Cognitive-behavioral therapy is psychological health counseling that can train gamers on how to substitute thoughts concerning video games to assist them in altering their addictive behaviors. It is noteworthy that McGhee [21] argues that involving parents to assist their young ones in the treatment process would help greatly. In cognitive-behavioral therapy, the individual with a gaming addiction is trained to link their thoughts, actions, and feelings and perceive how these things affect the recovery process. As such, this therapeutic process shows individuals with gaming addictions how harmful their actions and feelings are to their lives and assists them in recognizing their negative thoughts. Negative emotions occur due to impulses and misconceptions of internalized feelings of fear and low self-esteem [21]. By revisiting the negative and painful thoughts, video gamers can reduce their excessive gaming habits and learn new and positive behaviors that substitute for the addiction. Ultimately, cognitive-behavioral therapy helps an addict to dismiss negative thoughts and insecurities that cause the addiction, offers self-help equipment to improve their moods, and trains efficient communication skills [22].
- Motivational Interviewing: This therapy promotes motivation to alter addictive behaviors through exploring and resolving ambivalence and concerns of the addict. Motivational interviewing techniques involve reflective listening, affirmation, open-ended questions, and summarization to give the individual a chance to replace their addictive behaviors with new ones. Many individuals have developed addiction as a coping mechanism to handle life dilemmas or issues that occur in their daily life. Therefore, the idea of giving up on video gaming can be hard without motivation [21]. Most video gamers are isolated from social activities as they spend most of their time alone, thus making any lifestyle changes difficult. They may feel that the need to leave the game is not the real goal as they have no friends out there. Motivational interviewing assists these individuals in overcoming their insecurities, fostering ambitions, and walking them through their recovery journey. According to McGhee [21], motivational

interviewing has major concepts that make it unique among treatment approaches for addiction. First, the classes are known as interviews where the facilitator and patients collaborate, then the patients are encouraged to form their goals, and last, it leads to the patients achieving autonomy. Allowing a person to feel in control of their recovery journey encourages them to continue setting goals, hence increasing their self-motivation. Sometimes, undergoing rehabilitation can make the patients feel like they are surrendering their authority and freedom to a therapist. However, motivation interviewing focus on ensuring that patients are empowered as the ability to make change lies in their confidence and actions. Patients form a strong connection with the facilitator; hence, their relationship does not decline with the patient's sense of control over their recovery [21]. Ultimately, this form of therapy involves evoking the patient's motivations to change; thus, after finding their focus, the facilitator can bring the patient's attention to recovery.

- Reality Therapy: According to McGhee [21] reality therapy encourages an individual to decide to transform their behavior to enhance their lives. Addicts commit to change, learn time management, and work on acquiring alternative habits to gaming. Several years of gaming can change an individual's cognitive thinking, thus making real-life decisions and learning to manage their thinking become difficult and challenging tasks for addicts. Reality therapy focuses on setting goals and investigating whether recent behaviors work against or toward these goals. Sticking to reality is essential to reshaping the addict's behaviors. In this sense, reality therapy has been used to assist videogame addicts in overcoming their excessive gaming behaviors. It is a unique type of therapy that focuses on the present and future with near-avoidance of the addiction and purposeful action to change [21]. Reality therapy assists patients in staying focused on addressing concerns they can control at the moment and in the future. It helps patients be in control of what they can and accept things that they cannot control.
- Wilderness Therapy: This form of therapy combines nature and survival skills with rehabilitative techniques to address addiction disorders and behavioral issues. McGhee [21] reports that wilderness therapy occurs in an outdoor social setting. It puts people in an unfamiliar context to concentrate on self-environment while overcoming problematic behaviors with coping skills. This therapy aims to foster individual and social accountability while promoting emotional growth. A patient's unique needs are assessed and used to design a suitable treatment approach to address behavioral issues. The patients will live in the wilderness to develop life skills through undergoing activities that are psychologically and physically demanding. According to McGhee [21], the length and amount of time spent in the wilderness vary while video games are banned. In this program, participants interact with nature, build self-confidence, enhance interpersonal relationships, and establish life goals with the help of the treatment team. Wilderness therapy is designed based on positive therapeutic associations between the facilitator and patient. This connection can be featured through empathy, care, patience, and compassion. Facilitators do not force alteration; instead, they allow patients to work through any resistance to treatment on their own. A wilderness setting is the treatment tool used to influence actions and allow natural outcomes of patient behavior to enhance a sense of responsibility.
- 12-Step Therapy: Each addiction has its 12-step program based on spiritual principles. McGhee [21] states that the 12-step therapy is a mutual support program applied in an outpatient environment. Video game addicts can participate in support groups that follow traditional 12-step self-help approaches guidelines, during which they learn to cope with their addiction while avoiding triggers that can cause relapse. The program allows the patients to live a well-balanced life, and they are encouraged to attend 90 sessions in 90 days. The program has assisted many addicts in overcoming their addictive behaviors, and each addict works with a sponsor to make the program more effective. In particular, Gaming Addicts Anonymous is a program that involves a group of people who support each other in recovering from issues linked to excessive playing [21]. Another 12-step program for gaming addicts is Online Gamers Anonymous, a self-help group where people share their experiences, hope, and strengths while supporting each other to recover.

4. Conclusions

We are fully aware of the usefulness of technology in education, as well as its impact on the younger generations [23]. Nevertheless, technology addiction and other similar addictions among university students are still little studied [24]. The prevalence of video games has increased over the years, capturing many people's imaginations worldwide since the 1970s. The graphics of older video games were simpler than today's multifaceted games, which have thus attracted many children and adults [25]. However, video gamers waste much time gaming as they try to win. In this sense, video game addiction has been recognized due to increased time spent on gaming. Currently, video games are widely available due to the advancement of technology and many available arcade machines making the games always accessible. Furthermore, the presence of handheld game devices has also contributed to video game addiction. Although the concept of video game addiction is controversial, its negative effects on gamers are a reality. However, the source of video game addiction is unknown; therefore, further research on this topic is necessary. Although it is not classified by the American Psychiatric Association as a mental illness, video game addiction can be problematic and require a treatment plan. In this regard, educational and rehabilitation strategies have been employed to help remedy video game addiction.

References

- [1] P. Limone, G. A. Toto, Psychological and emotional effects of digital technology on children in covid-19 pandemic, *Brain Sciences* 11(9) (2021), 1126. doi:10.3390/brainsci11091126.
- [2] S. Prot, K. McDonald, C. Anderson, D. Gentile, Video Games: Good, Bad, or Other?, *Pediatric clinics of North America* 59(8) (2012), 647-658. doi: 10.1016/j.pcl.2012.03.016.
- [3] I. Hernandez, *Giocare sul serio. Un seminario sui Game Studies*, *Il Bollettino*, 11-12 (2018), 20-21.
- [4] J. D. Ivory, A brief history of video games. in: R. Kowert, T. Quandt (Eds.), *The video game debate: Unravelling the physical, social, and psychological effects of digital games*, Routledge, 2015, pp. 1-21, ISBN: 9781138831636.
- [5] P. Limone, G. A. Toto, B. Cafarelli, The decision-making process and the construction of online sociality through the digital storytelling methodology, *Electronics (Switzerland)* 10(20) (2021), 2465. doi:10.3390/electronics10202465.
- [6] M. D. Griffiths, The therapeutic and health benefits of playing video games, in: A. Attrill-Smith, C. Fullwood, M. Keep, D. J. Kuss (Eds.), *The Oxford handbook of cyberpsychology*, Oxford University Press, 2019, pp. 485-508. doi: 10.1093/oxfordhb/9780198812746.013.27.
- [7] S. García-Bravo, A. Cuesta-Gómez, R. Campuzano-Ruiz, M. J. López-Navas, J. Domínguez-Paniagua, A. Araújo-Narváez, A., ... and R. Cano-de-la-Cuerda, Virtual reality and video games in cardiac rehabilitation programs. A systematic review, *Disability and Rehabilitation*, 43(4) (2021), 448-457. doi: 10.1080/09638288.2019.1631892.
- [8] L. Gros, N. Debue, J. Lete, C. Van De Leemput (2020), Video game addiction and emotional states: possible confusion between pleasure and happiness?, *Frontiers in psychology*, 10 (2020), 2894. doi: 10.3389/fpsyg.2019.02894.
- [9] S. Triberti, L. Milani, D. Villani, S. Grumi, S. Peracchia, G. Curcio, G. Riva, What matters is when you play: Investigating the relationship between online video game addiction and time spent playing over specific day phases, *Addictive Behaviors Reports*, 8 (2018), 185-

188. doi: 10.1016/j.abrep.2018.06.003.

[10] C.N. Plante, D. A. Gentile, C. L. Groves, A. Modlin, J. Blanco-Herrera, Video games as coping mechanisms in the etiology of video game addiction, *Psychology of Popular Media Culture*, 8(4) (2019), 385-394. doi: 10.1037/ppm0000186.

[11] C. L. Mathews, H. E. Morrell, J. E. Molle, Video game addiction, ADHD symptomatology, and video game reinforcement, *The American journal of drug and alcohol abuse*, 45(1) (2019), 67-76. doi: 10.1080/00952990.2018.1472269.

[12] Y. Jin, L. Qin, H. Zhang, R. Zhang, R. (2021, December), Social Factors Associated with Video Game Addiction Among Teenagers: School, Family and Peers, 4th International Conference on Humanities Education and Social Sciences (ICHESS 2021), 763-768). doi: 10.2991/assehr.k.211220.131.

[13] C. J. Ferguson, J. Colwell, Lack of consensus among scholars on the issue of the video game addiction, *Psychology of Popular Media*, 9(3) (2020), 359-366. doi: 10.1037/ppm0000243.

[14] O. Geisel, A. Lipinski, M. Kaess, Non-Substance Addiction in Childhood and Adolescence: The Internet, Computer Games and Social Media, *Deutsches Ärzteblatt International*, 118(1-2) (2021), 14-22. doi: 10.3238/arztebl.m2021.0002.

[15] M. H. Baturay, S. Toker, Internet addiction among college students: Some causes and effects, *Education and Information Technologies*, 24(5) (2019), 2863-2885. doi: 10.1007/s10639-019-09894-3.

[16] A. Oflu, S. S. Yalcin, S. S., Video game use among secondary school students and associated factors. *Usos de videojuegos en alumnos de la escuela secundaria y factores asociados*, *Archivos argentinos de pediatría*, 117(6) (2019), e584–e591. doi: 10.5546/aap.2019.eng.e584

[17] D. L. King, D. L., P. H. Delfabbro, Video game addiction, in: P. Miller (Ed.), *Adolescent Addiction*, Elsevier, 2020, pp. 185-213. doi: 10.1016/B978-0-12-398336-7.00082-6.

[18] S. Peracchia, G. Curcio, Exposure to video games: effects on sleep and post-sleep cognitive abilities. A systematic review of experimental evidence, *Sleep Science*, 11(4) (2018), 302-314. doi: 10.5935/1984-0063.20180046.

[19] B. Davies, E. Blake, Evaluating existing strategies to limit video game playing time, *IEEE Computer Graphics and Applications*, 36(2) (2016), 47-57. doi: 10.1109/MCG.2016.25.

[20] J. Richard, E. Fletcher, S. Boutin, J. Derevensky, C. Temcheff, Conduct problems and depressive symptoms in association with problem gambling and gaming: A systematic review, *Journal of Behavioral Addictions*, 9(3) (2020), 497–533. doi: 10.1556/2006.2020.00045.

[21] M. McGhee, Video game addiction treatment program options, 2020. URL: <https://www.psychguides.com/behavioral-disorders/video-game-addiction/treatment/>.

[22] M. Stevens, D. L. King, D. Dorstyn, P. H. Delfabbro, P. H., Cognitive-behavioral therapy for Internet gaming disorder: A systematic review and meta-analysis, *Clinical psychology & psychotherapy*, 26(2) (2019), 191–203. doi: 10.1002/cpp.234.

[23] G. A. Toto, From Educational Contexts to Addictions: the Role of Technology in Teaching Methodologies and in Prevention as an Educational Function, *Journal of E-Learning and Knowledge Society*, 14(2). <https://doi.org/10.20368/1971-8829/1504>.

[24] P. Limone, G. A. Toto, Factors That Predispose Undergraduates to Mental Issues: A Cumulative Literature Review for Future Research Perspectives, *Frontiers in Public Health*, 10 (2022), 831349. doi: 10.3389/fpubh.2022.831349.

[25] K. Goode, S. Vasinda, Videogames and sensory theory: Enchantment in the 21st century, in: L. Haas, J. Tussey (Eds.), *Disciplinary literacy connections to popular culture in*

K-12 settings, IGI Global, 2021, pp. 162-183. doi: 10.4018/978-1-7998-4721-2.