Damage Caused by Addiction to Violent Computer Games on Children Aged 5-7 in Shiraz, Iran: A Mixed Method Study

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Original Article

Abstract

Introduction: Computer games today are widely used to improve cognitive performance. Selective attention is one of the cognitive skills whereby individuals can process certain events from among several driving factors and neglect others. The purpose of this study is to investigate the effect of the first-person shooting (FPS) computer game style on the level of selective attention (visual focus).

Materials and Methods: This study was an experimental study with experimental (n = 15) and control (n = 15) groups. The game was designed in the style of a first person sniper controlled by the eye tracker as an input tool. Data analysis was performed using univariate analysis of covariance (ANCOVA).

Results: There was no significant difference between the two groups before the study (P ≤ 0.502). After participating in the study, the visual concentration in the control group did not change significantly (P ≤ 0.001), meaning that the game scores improved after the intervention.

Conclusion: It seems that the FPS computer game using an eye-tracking tool improves visual focus through a cognitive-rehabilitation process.

Keywords: Eye tracker; First person sniper game; Eye gestures; Visual focus

Introduction

Play is often an optional activity aimed at entertainment and enjoyment, which emphasizes several points including being voluntary, time and space constraints, rules of the game, purposefulness, feeling of tension and pleasure, and awareness of the difference with ordinary life (1). However, video games have features that make them attractive to players, with the most important ones being interactivity, storytelling, capability of leading others, self-externalization, and gaining new experiences (2). At present, in Iran, a large part of students' leisure time, which is outside school hours, is spent on video games (3). Video games, with their amazing attraction, are able to select their main audience from among children and adolescents, and not only occupy a significant part of their leisure time, but they also cover the time they have to spend on homework or attend family gatherings (4).

One of the factors that causes child violence in computer games is the presence of competition. This competition and aggression varies in different games according to the speed and capabilities of the game (5). Excessive engagement in computer games reduces physical activity as well as physical and mental health (6). In the United States, children aged 8-10 spend an average of 65 minutes a day playing computer games (7). The American Entertainment Software Association (ESA) reported in 2008 that an average of 70-90% of American teenagers and young

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adults spent their time playing computer games (8). Among children and adolescents across the United States, an average of 99% of boys and 94% of girls spend about 40 hours a week playing video games (9), and by the same proportion, adolescents and young individuals in the rest of the world tend to play computer games (10). In fact, it can be claimed that today, computer games are a means to satisfy the psychological needs of their users, such as the need for entertainment and recreation, the psychological mechanism of overcoming, a way to escape reality, social reciprocal needs, the need for arousal, competition, and the need to feel power (11).

Among computer games, games with war, action, and adventure content account for the most users (12). A distinctive feature of action and war games is high violence and the use of cold steel and firearms to kill the opponent character (13). In this type of games, anthropomorphic animals or robots are employed and the user uses movements such as running, jumping, climbing, or crawling to achieve the goal (13). The appeal of video games stems from the way they are designed and developed (14). In these games, in order to make the games attractive, the developers give the users different options by dedicating a section to them, so that they can decide for themselves what tools and methods to use and what ways to go to reach the goal (14). Boys tend more to playing violent computer games than to watching violent television programs; because these games have a stronger effect on satisfying the aggressive needs of children, during which the child is active and has the ability to control violent actions. Additionally, in such games, the player is rewarded by increasing the violent behavior, or is allowed to use it to advance the game to the next stage (9).

The increasing number of video game users, especially the increasing interest of boys in such games, has attracted the attention of many researchers to the effect of these games on children's mental, behavioral, and physical health and has led to two main views about it. The first group consider this type of games to have a useful and effective function and believe that such games not only do not harm the mental, behavioral, and physical health of children, but also playing them drains children's inner emotions and feelings, and winning the game has a positive effect on increasing their self-esteem and self-confidence, in addition to success in performing activities (15). On the other hand, seeing scenes of rape and sexual violence and abnormal behaviors causes psychological damage and reduces children's sensitivity to these issues (16).

Excessive addiction to online games causes problems such as reduced mental health, reduced social relationships, neglect of tasks and activities related to family and education, anxiety, and fear symptoms in children (17). The greatest negative impact of video games is on the occurrence of aggressive behaviors. These games are associated with intense excitement, and their most prominent emotional components include aggression, hostility, and anger (18); in a way that there is a significant relationship between the duration of playing these games and different types of aggression, and with increasing the time of playing these games, especially violent games, the amount of aggression increases (19). This vulnerability also includes children (20). Across the United States, 89% of video games have a high rate of violence. The impact of these games on American youth and adolescents in recent years has been such that it has led to aggression among these age groups and the loss of social order and security in this country (9).

At the same time, these games also affect the body of the players. The effect of computer games on the physical dimension is mostly related to musculoskeletal diseases (MSDs) that increase or decrease metabolism and significant changes in the number of immune cells (18). Moreover, video games significantly increase heart beat rate and blood pressure, respiration rate, and body temperature (21). A common danger of computer games is the repeated stress injury (RSI) due to the constant repetition of certain movements. Other injuries that can result from playing for long periods of time include hand and arm tremor syndrome. Furthermore, eye damage and fatigue and obesity are due to the sedentary nature of these games (22).

Materials and Methods

This qualitative study was carried out in three stages.
1. Identifying the favorite games of children with computer game addiction (through observation and interview)
2. Identifying the characteristics of these games in terms of potential for physical, mental, and psychological damage (through content analysis of games and interviews)
3. Addressing the effect of play therapy or the use of educational technologies to reduce the problems caused by these injuries or addiction to computer games (reporting practical methods, taking the subjects to the pool, and watching movies or drawing)

The statistical population of the study consisted of 5-7 year old children in Shiraz, Iran who played computer games daily for a long time in the city

gaming centers. First, a list of all active gaming centers in Shiraz was prepared. Among the available gaming centers, a list of gaming centers that did not have an age limit for users and users with different age ranges could attend there was prepared. From this list, a gaming center was randomly selected (by lottery). This center had 90 users aged 4-19 years, of whom 38 ones (2, 12, 6, 10, and 8 users aged 4, 5-7, 8-12, 12-16, and 16-19 years, respectively) with subscription code and identity document (ID), had the membership right and were permanent users. Among them, after obtaining parental consent, the behavior and performance of 5 children aged 5-7 years while playing in the gaming center were imperceptibly observed and examined for 7-8 months. In this study, data collection was performed using three tools of observing children's behavior while playing and recording their behavior, semi-structured interviews with mothers of children while attending the gaming center for 8 months and phone calls with them, and replacing other games with the video games for 8 months (twice a month).

The observation and interview tools were utilized to perform step 1 and identify children with computer game addiction. In order to select the samples and for a better and deeper understanding of the effect of the video games on the three mental, behavioral, and physical dimensions, the researcher worked as a human resource in one of the gaming centers of Shiraz and in 3 stages, he examined the willingness of the users to play the video games and observed their behavior and performance while playing the game.

In the first stage, during 3 months, the researcher first identified the users who had more playing hours during the week than other people and had a subscription code, with the help of the person in charge of the gaming center, and then selected 5 samples from 12 users aged 5-7 years (2, 1, and 2 children aged 5, 6, and 7 years old, respectively). The study inclusion criteria included the long period of using the game and the constant presence in the gaming center during the week, the proximity of the children's place of residence to the gaming center, and the possibility of communication with their parents. By appointments with the parents of the children at the gaming center, while explaining the details and the study process to them, their positive and agreeing opinion about the study was attracted.

In the second stage, for 7-8 months, the children's behaviors and performance during play were carefully observed and recorded, and in order to obtain more and additional information about the effect of the video games on their psychological, behavioral, and physical characteristics, an interview was held with

the mothers of these children regarding their behavior and performance at home after the game.

At the end of this stage, after studying the effect of violent video games on the psychological, behavioral, and physical characteristics of the children during play, with the consent of the children's parents, the researcher arranged a meeting with a child counselor. Then, with the help of the child counselor and parents, the interests of each child in alternate games (intellectual and sports games, watching animated and cartoon movies, and going to the swimming pools and painting) were identified, and the counselor provided parents with solutions to gradually reduce play time over a period of 8 months. In the next step, with the help of the parents, the researcher examined the effect of educational technologies (other alternate games) in reducing the harms of addiction to violent video games on the psychological, behavioral, and physical characteristics of the 5-7 year old children at home. In both stages of playing the game for 8 months and substituting other educational games for the video games in 8 months, to complete the information and evaluate the effectiveness of alternative methods, the researcher used the semi-structured interviews (once a month) and informal, free, and telephone conversations in some cases (twice a month).

Results

In this study, the users' names were changed to protect the participants' personal rights and fiduciary.

What were the favorite games of children with computer game addiction?

Based on the observations, among the games available in the gaming center, 6 games were more welcomed and interested by the users compared to other games due to their high attractiveness, excitement, action scenes, diverse atmosphere, and content. In fact, out of the 38 regular users in the gaming center, 25 were interested in this type of game. With the help of the person in charge of the gaming center as well as the interview with the children, their favorite games were identified, which are described in table 1.

The observations revealed that younger children (4-7 years old) tended to play imaginative-emotional space games in which the images were as cartoons, the hero of the story was a child or an anthropomorphic animal, and the content and steps were simpler and easier, in which the children were less involved in mind games (such as Ben10 and Ninja turtles). However, in older children (9-19 years old), in addition to action and war games, there was a greater tendency

Table 1. Children's favorite games

Game name	Game features	Game type	Age of interested users (year)
Ben10	Ability to adjust game graphics, users without any previous information can easily interact with the game	Action and adventurous	4-7
Ninja turtles	Attractive characters, one-on-one battles, increased speed of action	Action and adventurous	4-7
GTA	3D environment and excellent simulation, giving users the freedom to use a variety of military equipment and vehicles	Action, war, and adventurous	≤ 4
Call of Duty	Ability to compete with other friends and win group prizes, improve skills to go up in the box score	Action, war, adventurous, and intellectual	≤ 9
Counter	Ability to play online and offline unlimitedly, the ability to develop war strategies	Action, war, adventurous, and intellectual	9-13
Stronghold crusader	Creating an epic mood, competing as multiplayer and online, with various buildings with different applications	Action, war, and intellectual	11-19

for mind games that require problem-solving thinking, important decisions during the game, and ultimately competing with other players for wins and losses (such as Call of Duty, Counter, and Stronghold crusader).

What were the prominent psychological, behavioral, and physical damages in analyzing the content of children's favorite computer games?

Ben10: An animated set created by a person named "Steven Seagal" and is related to the story of a child who, with his extraordinary power, appears in different spaces so that users can perform various actions with his help. In this game, Ben10 or Ben Tennyson is the name of the boy all of whose power is in his watch (23). This watch, called Omentrix, has a lot of energy and works in such a way that Ben10 can become one of the ten space and imaginary creatures available in his watch with each push of a button, and fight the evil force (lagoon fire, huge creature, Fingoli or small creature, fast-headed creature, space fly, wild dog, four-handed creature, spider monkey, icy creature, colored stone, space spirit, diamond-headed creature, Tefhit, magnetic creature, and polaris). In each version of the game, Ben fights a space creature or a giant creature created by Dr. Amino, such as a giant mouse, a fire bat, and a giant frog, and earns a point for killing each giant creature, and if he successfully completes all the stages, he wins. During all the steps, the user must pay attention to watch's charge; because if it runs out of charge, the user loses (23).

Ninja Turtles: Created in the 1980s by Peter Lord and Kevin Eastman in a comic strip book, it set the stage for the global market, and later a series of animations, movies, computer games, and various toys with the turtle logo was made based on this

series. This animated series includes 5 series including Mutant Turtles 1984, Small Turtles 1996, Legendary Turtles 1998, Ninja Turtles (current version) 2009, and Future Ninja Turtles 2012. This animated series is about 4 mutant anthropomorphic hero turtles.

Michael Angelo, or Micki, is one of the most popular and beloved turtles; as it is witty and sometimes clumsy and even dumb. It is wearing in orange and the weapons it uses are two nunchakos. Leonard, abbreviated Leo, is the older brother and, in a way, the leader of this group of four. The weapons it uses are a pair of Katanas (long, sharp swords) and its cover is blue blindfolds and armbands. Donatello, or Don, is the most intelligent member of the group, who sometimes invents devices that help the turtles achieve their goals and destroy their enemies. Don is wearing purple and the weapon it uses is a kind of wood (bō). Raphael is the most violent turtle in the group. It is hot-tempered, capricious, and emotional, and gets nervous easily; for this reason, it sometimes causes unwanted problems for the group. Raph uses a red cover, and its defensive tool in this animation is a kind of dagger (25). The four turtles learn Ninjutsu from a mouse (Master Splinter) that is mutant and anthropomorphic like them. They live in New York sewers and fight enemies with their unique characteristics. The salient features of this game are the use of one-on-one combat in this game, which has brought more appeal to children (24).

GTA: The story game has a long and complex story in which the hero of the game is a black person. The first version of the game was made in 1998 under the name Grand Theft Auto by Take-Two video game developing company and directed by Landon in a

two-dimensional environment. In this version of the game, a small man is shown from the top of the screen. The game revolves around examining the main character of Niko's story and his tasks such as walking the streets, driving, and shooting, and performing various missions. The second version, released in 1999, came with features of changing the map, adding new cars, and a variety of music to the game. The third edition was released in 2002. In this game, the two-dimensional environment of the game changed into a three-dimensional one, and the ability to ride a motorbike and the possibility of shopping from various places such as pizzerias, ice cream parlors, and film studios were added to this version. The fourth version was released in 2005 as Grand Theft Auto: San Andreas. In this version, the story of the game begins in the city of San Andreas and the stages of the game were very long and so vast and interesting that the user was overwhelmed. Prominent features of this game were predicting the ability to ride a bike, change the speed of cars, buy weapons, get tattoos, buy clothes, buy pizza, and buy a house in different parts of the city. Version 5, released in 2008, was about the main character in Niko's story. Niko is a Russian professional criminal, aged 40-45, who was imprisoned for harassing (raping) an Indonesian child and was recently released from the prison, and does everything he can to make money. In this game, the user has a wide freedom of action and by entering the desired password can steal a police car and use a combat helicopter, buy and sell drugs, use explosives, kill people with cold weapons and firearms, establish friendly relations with girls, attend a party space and dance and have romantic relationships with girls, listen to different and varied songs, and perform various and interesting missions (25).

Call of Duty: A type of action game in which players must fight alongside other soldiers without interruption once they enter the battlefield. Players can choose from a variety of characters with a variety of appearances. There is a high variety of game weapons and they can be upgraded. The game designers have designed different modes for in-field combat, and players must complete the intriguing challenges of each mode. The way the game is displayed is as the first person, and the professional game play allow you to easily move and aim. Better fighting in the battle means raising the ranking of players in the ranking table. One of the strengths of the game is its very high graphics that play a key role in conveying the excitement of the fight. The environment around the game is very diverse and filled with interesting items. The task of the players is

to survive the epic battles and they can participate in more than 100 battles in team play mode in the form of two, four, or even one person teams. Players can also ride various vehicles such as helicopters, warships, and Advanced Technology Vessels (ATVs) to navigate the sea, land, and air (26).

Counter: A shooting video game developed by Volvo and the Rush team companies. The game starts while the players are in their proper place and in most cases they are waiting to start. A player can choose from among different character models and use different weapons. A multi-stage violent game that invites players to rise up against oppression and terrorism. The player enters different places with other players, where there is a possibility of the enemy being present in every corner. Players can defeat the enemy using maps, automatic guns, shotguns, and even hand grenades (27).

Crusades: One of the games in the Castle Strategy series was Firefly Studios, released in 2002 (28). This game did not have high graphics, but it was received very well. The game focuses on military victory and superiority in medieval wars, and individual work and reckless attacks will cause the player to defeat. In this game, players defend their dream land against invaders by building tall castles and forming a strong army, and become the king of their dream lands. In the course of the game, enemies from other lands intend to attack and seize the opponent's lands. The player must defend his resources with tact and vigilance and protect his castle from enemy attacks by building high walls. This game includes stages such as breaking the siege, capturing enemy soldiers, forcing the enemy to extract more gold, and as a result, more money to buy weapons and prevent the enemy from invading and so on (28).

The main content of these games is based on beating, violence, killing, and destroying the opponent (Ben10 and Ninja Turtles games), in addition to violating the rights of others, stealing from public places, stealing cars, smuggling, and buying and selling drugs, as well as methods and strategies to escape from the police, disguise, change job and car, and in general, lawlessness (GTA and Call of Duty games), or promoting racism and tarnishing the image of ethnicities and minorities from other countries (Counter and Crusades games). The age, duration of the video game, and the type of favorite game of the 5 children studied in the present study along with their psychological, behavioral, and physical characteristics are summarized in table 2.

As presented in table 2, observing the child for 8 months while playing games at the gaming center and interviewing their parents indicated that the greatest effect of these games on the psychological dimension

Table 2. Game type, duration, and behavioral injuries in the three mental, behavioral, and physical dimensions during the game

User name	Age (year)	Type of favorite game	Duration of the game per week (hours)	Mental, behavioral, and physical injuries of behaviors observed during the game		
				Mental	Behavioral	Physical
Ali	7	GTA, Ben10, Call of Duty, Ninja Turtles	12-25	Impulsive behaviors, anxiety, screaming, hitting themselves when making a mistake or being deceived, and having extreme excitement in the sensitive parts of the game	Aggression and physical contact with other children, performing dramatic movement after receiving points, anger, immorality, and inflammability	Obesity
Saeed	7	GTA, Ben10, Ninja Turtles	12-21	Extreme excitement, screaming and reddening of the complexion, and stress in playing the game	Aggression, performing dramatic movements to imitate the game	-
Omid	6	Ben10, Ninja Turtles	9-19	Anxiety, frequent contraction of the body during play, and cooling of the limbs	Rough dramatic movements, inopportune anger	Poor vision
Muhammad	6	GTA, Ben10, Ninja Turtles	10-18	Impulsive behaviors, anxiety, stress and extreme excitement, fear of going to the bathroom on alone	Aggression, performing rough dramatic movements, immorality	Obesity and immobility, enuresis, stuttering
Majid	5	Ben10, Ninja Turtles	7-14	Severe stress, screaming, nail biting, cold hands and feet during the game, haste and repeated excuses, and fear of going to the bathroom alone	Performing dramatic movements and imitating the movements of the game characters	Poor eyesight

appeared as anxiety, stress, and intense excitement in the form of shouting at the time of losing or gaining points from the opponent, impulsive behaviors, fear of loneliness, nail biting, and cold hands and feet.

These stressful situations, for example, in GTA, in controlling and directing vehicles such as cars and planes, stealing from public places and using knives and firearms to kill and destroy people and get more points, in Ben10 game, in the face of the icy creature, giants, diamond-headed creature, or other imaginary creatures, and in Ninja turtles game, in the simultaneous fighting with several evil forces such as Schrader, were observed in the children. In the behavioral dimension, aggression, violent dramatic movements, anger, and immorality, and in the physical dimension, inactivity, obesity and weight gain, enuresis, and stuttering were observed in the children.

What are the consequences of using educational technologies or alternatives in reducing injuries?

After 8 months of studying and examining children while playing and talking and contacting mothers in person, with their consent, a face-to-face counseling session was held with the child counselor at the counseling center and after taking to the children and their parents, the counselor examined their interest in alternative games. Finally, the parents were offered solutions to gradually reduce the amount of time the children spent playing. The type of the substitute game and the duration of the game for each child are presented in table 3.

Table 3. Type of substitute game and duration of play to work with each child during 8 months

User name	Substitute game	Game duration per week (hours)
Ali	Intellectual games, gymnastics and Karate training	3-5
Saeed	Training swimming and playing chess	4
Omid	Cycling, skating, and watching various cartoons	5
Muhammad	Doing puzzles, training gymnastics, cartoon cars	2-4
Majid	Construction, painting, cartoon cars	1-2

According to the parents, over the period of 8 months, the alternate games significantly reduced the game hours for each user during the week. The results of the interviews with mothers of children after replacing their favorite cases instead of the video games for 8 months also indicated a decrease in the video game hours and the resulting injuries, which requires parents to pay attention to correct identification and increase awareness of the needs and interests of children. In the following, the results of the interview with the parents after replacing the children's favorite cases instead of the video games and its consequences are presented.

Interviewing with mothers of children after replacing other favorite games of the children with the video games and its consequences: Ali and Muhammad were brothers. According to their mother, going to gymnastics and karate classes drained Ali and Mohammad energy to a great extent, and when they came back home, they quarreled less. Additionally, in their spare time, they played with each other mostly intellectual games (puzzles) or watched cartoons. Of course, eight months after reducing the GTA, Ben10, and Ninja Turtles play time, they were still arguing with each other and behaving strangely, but compared to the past, their noise during the fight was less. Muhammad slept better at night, his enuresis improved over time, and he was less afraid of going to the bathroom alone. Moreover, he no longer woke up screaming. Ali spent most of his time at home doing homework and was less careless in doing his homework and doing his personal chores. His mother described him as wiser as and calmer than before; However, he still sometimes instructed Muhammad to perform his personal duties, which led to fights between them.

In her interviews after replacing the training games, Omid's mother believed that although he was restless and sad about not going to the gaming center and playing for a long time, taking him and her sister to the skating rink and learning to skate under the supervision of a coach reduced his discomfort. Skating seemed exciting for Omid, especially since he spent most of his time with his father. As soon as he got home, Omid described everything that had happened to him on the rink in detail; whereas in the past, after playing video games and coming home, he used to talk less and get angry and behave badly with the slightest word. During this time, his relationship with his sisters improved considerably, and they spent more time together watching cartoons. Omid less made excuses for not going to the preschool and less cried to buy items with the Ben10 logo. His eyesight condition did not change much and he continued to wear glasses due to poor eyesight.

According to Saeed's mother, going to swimming and chess classes after school filled most of his time. When he was at home, he was mostly busy with his homework and sometimes playing chess with his father. Saeed's mother still allowed him to play video games sometimes for a few hours at home during the week, after finishing his homework. In her opinion, replacing the swimming and chess class and playing games at home were useful in calming Saeed and draining his emotions as well as satisfying his sense of competition with his peers. Saeed's aggression and immorality were greatly reduced. Sometimes, however, he imitated the behavior of game creatures. For example, he would walk to his mother with a loud noise and shout *The giant creature* or *The icy creature.* Saeed's mother wanted to increase the amount of play to about 1 hour per week, because she believed that the effect of these games would not disappear until it was completely stopped.

Majid's mother believed that during these 8 months, arranging her time so that she could be at home longer and hiring a babysitter for times when she was not at home were very effective in reducing his behavioral problems. Although at first Majid felt strange with his sitter and was immoral towards her, but gradually his relationship with his sitter, who had a son of the same age as Majid, became very good and he spent most of his time with the sitter and her son painting, watching car cartoons, and sometimes building toy buildings. Being at home and having a playmate of the same age was very influential in Majid's behavior and he became much more good-natured and calmer. He made fewer excuses, and according to his mother, his dependence on his mother and father was greatly reduced. However, some nights he was still afraid to go to the bathroom alone. His nail biting was much better using the solutions provided by the consultant and he rarely did so.

Discussion

In Iran, few studies have examined the effect of these games on users (19,20). Therefore, the present study investigated the effect of video games on the three dimensions of mental, behavioral, and physical health of 5-7 year old children in Shiraz. One of the gaming centers in Shiraz was selected and 5 of the children who referred to this center were examined. The results suggested that despite the negative effects of computer game addiction on the occurrence of undesirable behaviors and physical and psychological changes in children, realistic and correct knowledge

of their interests and needs and proper planning to fill their free time with games appropriate to their mood can reduce damages caused by playing and watching violent video games and enhancing their mental, behavioral, and physical health.

In recent decades, a significant portion of children's leisure time has been spent playing computer games (3). These games with attractive and exciting content and diverse atmosphere and easy accessibility have become one of the most exciting and popular pastimes of human life in different age groups. The rapid spread of these games among children has increased public concern about the harmful effects of these games on the three dimensions of children's mental, behavioral, and physical health (6). On the other hand, the lack of proper planning by officials and families to fill children's free time and sometimes parents' lack of awareness of the destructive and sometimes devastating effects of these games and children's lack of access to appropriate recreational and sports facilities, have heightened this problem. (29). Playing these games for a long time puts the players in constant tension, restlessness, and apprehension; in a way that during the game, the players experience real physical tensions and arousals (6).

In the present study, observation of children's behavior and interviews with their parents showed that the most obvious impact of these games on the psychological dimension of children included increased stress, anxiety, impulsive behaviors, and fear. These findings were in line with the results of previous studies (16,17). Given the results of this study, the most obvious effect of these games was on the behavioral dimension, causing aggression, violence and physical contact with other children, performing violent dramatic movements, inopportune anger, immorality, and irritability in children, which is similar to the results of other studies (9,18-20). Furthermore, according to the results of this study, the most obvious effect of these games on the physical dimension was possible weakness in vision, inactivity, and weight gain in children, as addressed in previous studies (23). In the present study, in addition to the effect of video games on the three physical, mental, behavioral dimensions, the content of the children's favorite games was analyzed and appropriate alternative games were considered to reduce the harms of computer games, improving a significant part of negative psychological and physical behaviors and characteristics in children during 8 months. In other words, covering children's free time with physical and mental activities in accordance with their personality traits and under the supervision of a counselor can help families to impede the negative

effects of long-term use of computer games.

Limitations

In the first stage, the caution of some children in showing reaction limited the recording of behavior in some cases. For this reason, the researcher's lack of access to a standard and separate laboratory environment for in-depth observation of the participants was one of the limitations of the present study. On the other hand, the child's behavior at home was certainly different from that in the gaming center, but it was not possible to accurately observe and record their behavior at home, and the researcher's information in this regard was limited to parental reports.

Recommendations

Considering the influence of computer games in different age groups, observation and study of the impacts of video games on adolescent and young users aged 10-19 years in gaming centers and examining the effect of these games on family relationships and students' school achievement in middle and high school can be a good topic for research by other researchers.

To reduce the adverse effects of this group of popular games on children, cultural and educational stakeholders are recommended to educate people and parents and promote their culture to use counseling services and replace useful games with inappropriate games and put these goals at the top of family and children's educational programs. Furthermore, it is necessary to properly and strictly monitor the distribution centers and gaming centers and Internet cafés legally to prevent children from having fun with games that have been declared inappropriate by experts for their age range. It is necessary for children before the legal age to be members of gaming centers and internet cafes under the supervision of their parents, and the parents are required to be acquainted with the symptoms of cyber diseases and addiction to video games, especially violent games, through training classes.

Additionally, supporting extensive studies and designing and producing games appropriate to the culture of Iranian society with global and commercial standards of video games should be on the agenda of policy makers in this field; games that can compete with their non-Iranian counterparts and lead to the strengthening of positive behavioral and psychological indicators in the user by creating positive competition. Families are also advised to check the content of computer games themselves first and use games that are appropriate for their children's age and do not harm

them. Taking into account the results of the present study, families are advised to spend more time on healthy recreation with their children.

Conclusion

In children with violent game addiction, mental, behavioral, and physical injuries due to long-term use of these games were completely evident, and it seems that the alternative game program, which was chosen in consultation with the child and his parents, was well able to positively influence the child's symptoms.

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Authors' Contribution

Bibi Eshrat Zamani: Study design and ideation, study support, executive, and scientific services, manuscript preparation, specialized evaluation of the manuscript in terms of scientific concepts, approval of the final manuscript to be submitted to the journal office, the responsibility of maintaining the integrity of the study process from the beginning to the publication, and responding to the referees' comments; Negar Sadat Tabataba: attracting financial resources for the study, data collection, analysis and interpretation of results, manuscript preparation, specialized evaluation of the manuscript in terms of scientific concepts, approval of the final manuscript to be submitted to the journal office, the responsibility of maintaining the integrity of the study process from the beginning to the publication, and responding to the referees' comments; and Mozhdeh Mohajeri: providing study equipment and samples, data collection, analysis and interpretation of results, specialized statistical services, manuscript preparation, specialized evaluation of the manuscript in terms of scientific concepts, approval of the final manuscript to be submitted to the journal office, the responsibility of maintaining the integrity of the study process from the beginning to the publication, and responding to the referees' comments.

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Conflict of Interest

The authors of this study do not have a conflict of interest.

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