A pilot study on the effect of video games on ASD children's mental health and behavior and oral health management in Syria – 2023

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Abstract

This pilot study investigates the impact of video games on the mental health and behavior of children with autism spectrum disorder (ASD) in Syria. With the increasing prevalence of ASD and the growing popularity of video games, understanding the potential benefits and risks of gaming for children with ASD is crucial. The study explores whether video games can serve as a therapeutic tool or if they contribute to behavioral deterioration and addiction.
A sample of 50 children aged 6 to 12 years, diagnosed with ASD according to ICD-11 criteria, participated in the study. Data were collected through structured questionnaires completed by parents, assessing gaming habits, behavioral changes, and the level of video game addiction using the Internet Gaming Disorder Scale - Modified Short Form (IGDS9-SF). The study also evaluated the effects of replacing violent or repetitive games with more creative and interactive options, such as *Minecraft* and *Super Mario Bros.*
Results indicated that 90% of the children preferred playing video games over other activities, with boys showing a higher preference for violence and fighting games. Approximately 54% of the children exhibited signs of video game addiction, while 14% were classified as thoroughly addicted. During gameplay, 74% of the children displayed negative behaviors, such as increased aggression and reduced communication. However, after switching to more constructive games, significant improvements in communication, social interaction, and behavior control were observed.
The study concludes that while video games offer potential benefits for children with ASD, including improved social skills, reduced anxiety, and enhanced problem-solving abilities, they also pose significant risks, particularly in terms

How to Cite

O.A. Abdallah, B. Radic, L. Almasri, A. Palermo, A. De Giacomo, M.G. Asselti, F.L. Bunemer Guerra, A.J. de Paula Guerra, L. Ferrante, A. Semjonova, M. Corsalini, F. Inchingolo, A.M. Inchingolo, G. Dipalma, Alessio D. Inchingolo.
A pilot study on the effect of video games on ASD children's mental health and behavior and oral health management in Syria – 2023 .
Oral and Implantology
Vol. 17 No. 2 (2025), 117-126.
DOI: 10.11138/oi.v17i2.122

of addiction and negative behavioral outcomes. The type of game played is a critical factor in determining the impact of gaming on children with ASD. A careful selection of games that promote creativity, cooperation, and cognitive development can help harness the positive aspects of gaming while mitigating its potential harms. This study highlights the need for further research into video game-based interventions tailored specifically for children with ASD, aiming to balance therapeutic benefits with the risks of excessive gaming.

Keywords: Autism Spectrum Disorder (ASD), video games, gaming addiction, mental health, behavior, Syria, therapeutic intervention.

Introduction and Literature Review

Autism Spectrum Disorder (ASD) is a neurodevelopmental condition characterized by challenges in social interaction, communication, and restricted or repetitive behaviors. With the increasing prevalence of ASD worldwide, researchers and clinicians are continually exploring innovative interventions to support individuals with autism. Among these interventions, video games have emerged as a potential tool for both therapeutic and recreational purposes. However, the impact of video games on children with ASD remains a topic of debate. While some experts argue that video games can facilitate social interaction and improve cognitive skills, others raise concerns about the risk of addiction and negative behavioral outcomes (1–11).

The Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5) and the International Classification of Diseases, 11th Revision (ICD-11) both recognize gaming disorder as a condition characterized by impaired control over gaming, prioritization of gaming over other activities, and continuation of gaming despite negative consequences. For individuals with ASD, the risk of developing problematic gaming behaviors may be heightened due to their unique cognitive and social profiles. Children with ASD are often drawn to video games because they provide a structured, visually engaging environment that does not require face-to-face communication. This preference can lead to excessive gaming, which may exacerbate social isolation and other mental health issues (12–28).

Research by Mazurek et al. (2013) highlights that boys with ASD spend significantly more time playing video games compared to their neurotypical peers, with 41.4% of autistic adolescents spending their free time on gaming versus 18% of neurotypical boys. This increased engagement with video games can be attributed to the visual nature of gaming, the immediate feedback it provides, and the opportunity for escapism. For children with ASD, video games offer a safe space to explore and control their environment, which can be particularly appealing given their difficulties with social interaction and sensory sensitivities (29–33).

However, the potential benefits of video games must be weighed against the risks. Studies have shown that excessive gaming can lead to addiction, characterized by withdrawal symptoms, tolerance, and a preoccupation with gaming. Children with ASD may be particularly vulnerable to these effects due to their tendency towards repetitive behaviors and difficulties with self-regulation. Mazurek et al. (2015) found that children with ASD who engage in role-playing games are more likely to exhibit oppositional behaviors, while those who play sports games display fewer such behaviors. This suggests that the type of game played may influence the behavioral outcomes of children with ASD (34–41).

Despite these concerns, video games also offer potential benefits for children with ASD. They can serve as a platform for social interaction, particularly in multiplayer online games where players can communicate through text or voice chat. This form of interaction eliminates the need for eye contact, which can be challenging for individuals with ASD. Additionally, video games can improve motor skills, problem-solving abilities, and flexibility, all of which are important for the development of children with ASD. Games like Minecraft and Super Mario Bros. have been shown to enhance communication skills, reduce anxiety, and provide a rules-free environment where children can explore their creativity (42–57).

The neurological underpinnings of video game addiction further complicate the picture. Neurobiological studies suggest that addiction disorders, including gaming disorders, involve dopamine release within the brain's reward system. For individuals with ASD, atypical reward system responses may make them more susceptible to gaming addiction. The imbalance between motivation for social versus non-social stimuli in ASD could lead to a preference for gaming over real-world social interactions, further isolating the individual (58–71).

In summary, the relationship between video games and ASD is complex and multifaceted. While video games offer a unique opportunity for social interaction, skill development, and stress relief, they also pose significant risks, particularly in terms of addiction and behavioral issues. This pilot study aims to explore the impact of video games on the mental health and behavior of children with ASD in Syria, with a focus on both the potential benefits and risks. By understanding the motivations behind gaming in children with ASD and the factors that contribute to problematic gaming behaviors, we can develop more effective interventions that harness the positive aspects of gaming while mitigating its potential harms (72–91).

Connection to Dentistry and Oral Health Implications

Children with ASD often face significant oral health challenges, including poor oral hygiene, higher rates of dental caries, periodontal disease, and malocclusion. These issues are compounded by behavioral difficulties, sensory sensitivities, and non-compliance during dental visits. The behavioral impact of video games, as highlighted in this study, has critical implications for dental care management in this population (92).

Behavioural Regulation and Dental Cooperation

The observed improvements in social interaction and behavioral control, following the switch to more

constructive video games, suggest a potential indirect benefit for dental visits. Children with better communication skills and reduced anxiety may show greater cooperation during dental treatments, reducing the need for sedation or general anesthesia — a common requirement for uncooperative ASD patients. Future research could explore whether video games designed to improve self-regulation and social engagement might translate into better dental compliance. Moreover, studies suggest that children with ASD often experience heightened dental anxiety, which contributes to disruptive behavior during appointments. The behavioral improvements linked to certain types of video games could help mitigate this anxiety by fostering emotional regulation. If children can generalize the calming and focusing effects of positive gaming experiences to stressful settings like dental visits, they may approach these situations with more resilience. Dental practitioners could collaborate with behavioral therapists to recommend specific game types that promote relaxation and emotional control in children with ASD (93,94).

Impact on Oral Hygiene Routines

The high prevalence of gaming addiction observed in this study raises concerns about disrupted daily routines, including oral hygiene practices. Children who prioritize gaming over other activities may neglect brushing and flossing, increasing their risk of dental diseases. Dental professionals and caregivers should be aware of this connection and incorporate strategies to monitor and balance screen time with essential self-care routines. Additionally, children with ASD frequently display strong preferences for routines and repetitive behaviors, characteristics that gaming addiction may reinforce. This presents both a challenge and an opportunity. On one hand, the fixation on gaming can interfere with oral hygiene routines. On the other, this same tendency toward repetitive engagement can be redirected into consistent dental care habits if integrated with gamified oral health strategies. For example, a structured morning and bedtime routine linked to game progress or in-game rewards could create positive reinforcement for brushing and flossing (95).

Game-Based Dental Interventions

Given the affinity children with ASD have for video games, integrating gamification into dental health education could offer a promising approach. Interactive dental apps or virtual games designed to reward positive oral hygiene behaviors may enhance engagement and motivation. For example, games could simulate brushing techniques, offer virtual rewards for consistent dental care, or even include personalized avatars that "level up" with improved oral health. This approach could create a more familiar, rewarding, and less intimidating experience for children with ASD, fostering long-term healthy habits. Furthermore, virtual reality (VR) and augmented reality (AR) technologies offer immersive, interactive environments that could transform dental visits themselves. VR systems designed to simulate a game-like dental visit may help desensitize children to the clinical setting before an actual appointment. This could reduce fear and resistance, making dental procedures smoother for both the child and the clinician. Similarly, AR apps that overlay educational dental scenarios onto everyday environments could encourage children to see oral hygiene as an engaging, ongoing adventure rather than a chore. In summary, the behavioral influence of video games extends beyond mental health and social skills, intersecting with oral health outcomes. By understanding and leveraging this connection, clinicians and caregivers can develop more holistic, patient-centered strategies for improving both behavioral and dental health in children with ASD. Expanding research into tailored game-based interventions holds significant promise for enhancing oral hygiene routines, increasing cooperation during dental visits, and ultimately improving the overall well-being of children with ASD (96).

Materials and Methods

Study Design

This pilot study is a cross-sectional investigation designed to evaluate the impact of video games on the mental health and behavior of children with ASD. The study relies on primary data collected through a structured questionnaire distributed to parents of children diagnosed with ASD. The questionnaire assesses various aspects of the children's gaming habits, including the duration and type of games played, as well as the impact of gaming on communication, behavior, and performance.

Sample Population

The study sample consists of 50 children aged 6 to 12 years, with an average age of 9 years. The sample includes 39 males and 11 females, all of whom have been diagnosed with ASD according to the ICD-11 criteria and the Autism Diagnostic Observation Schedule (ADOS). Participants were recruited from three main autism centers in Damascus, Syria, as well as from the private practice of the lead author.

Data Collection

Parents were asked to complete a well-structured survey divided into two parts:

1. Part One: Collected demographic data, including the child's gender and age.
2. Part Two: Assessed the duration and type of games played, as well as the impact of gaming on the child's communication, behavior, and performance.

The Internet Gaming Disorder Scale - Modified Short Form (IGDS9-SF) was used to evaluate the level of video game addiction among the participants. Additionally, a follow-up evaluation was conducted after changing the type of game the child played to more creative and useful games, such as *Minecraft* and *Super Mario Bros.*

Ethical Considerations

Parental authorization and ethical approval were obtained before data collection. The study was conducted after approval of the child's responsible specialist was secured to validate all responses and details provided by the parents.

Ethical approval has been made through the Syrian Organization of Disabilities in line with their regulations and policies in monitoring and supervising their patients.

Results

Demographic Characteristics

The study sample consisted of 78% males and 22% females, reflecting the higher prevalence of ASD diagnoses in boys (Figure 1). The majority of children (90%) preferred spending time playing video games over engaging in other daily activities. Boys were more likely to spend extended periods (Figure 1) gaming, with 32% playing for 3-6 hours per day and 2% playing for more than 6 hours (Figure 2).

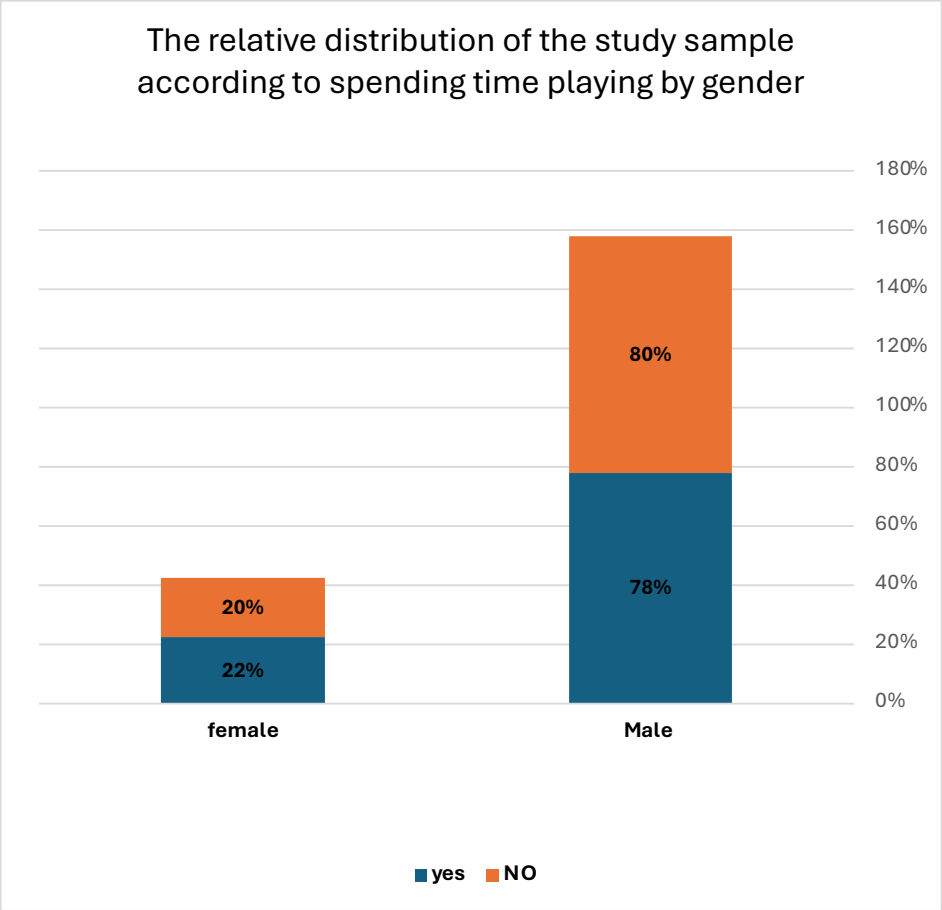

Figure 1. Demographic characteristics

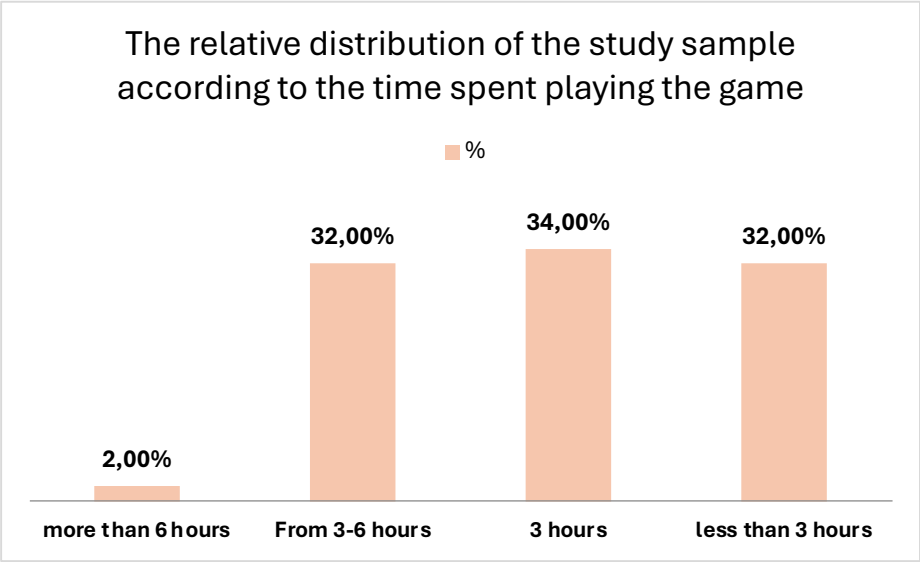

Figure 2. Relative distribution of the sample according to the time spent playing the game

Gaming Preferences

The most popular types of games among the children were focus skills games (58%), followed by mental skills games (20%), violence and fighting games (12%), and challenge and confrontation games (10%). Notably, boys showed a higher preference for violence and fighting games compared to girls (Figure 3).

Impact on Behaviour and Communication

The study found that video game play had a significant impact on children's behavior and communication. During gameplay, 74% of children exhibited negative behaviors, such as increased violence and reduced communication with their environment (Figure 4). However, after changing the type of game to more

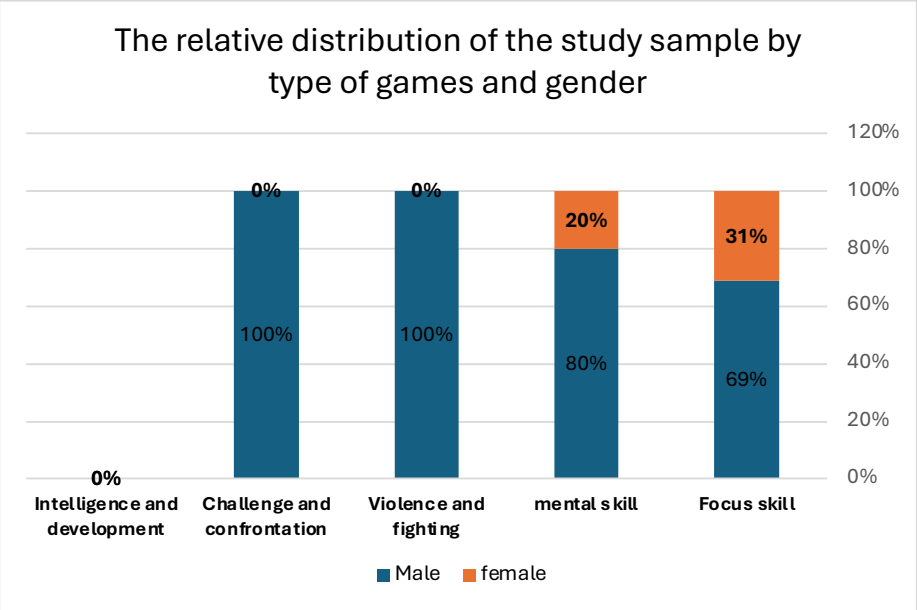

Figure 3. Gaming preferences between genders

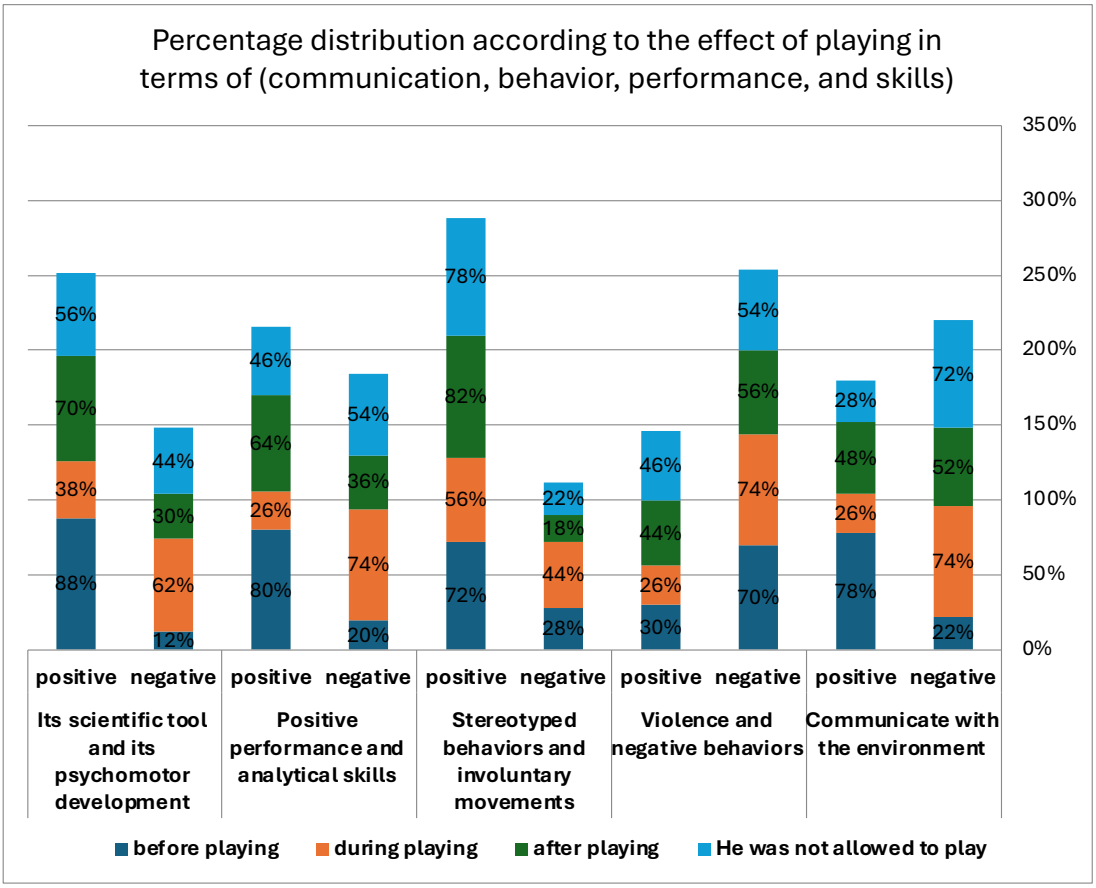

Figure 4. Impact of video gaming on behaviour and communication

creative and interactive options, there was a noticeable improvement in communication, social interaction, and behavior control (Figure 4).

Level of Video Game Addiction

Using the IGDS9-SF scale, the study found that 54% of the children exhibited approximately addictive behaviors, while 14% were classified as having a full addiction to video games. Only 6% of the children showed no interest in gaming, and 26% had a normal, controlled interest in computer games (Figure 5).

Discussion

The findings of this study highlight the dual nature of video games in the lives of children with ASD. On one hand, video games provide a structured and engaging environment that can improve social skills, motor skills, and problem-solving abilities. On the other hand, excessive gaming can lead to addiction, social isolation, and negative behavioral outcomes (97–99).

The preference for violence and fighting games among boys with ASD is particularly concerning, as these games may exacerbate aggressive behaviors. However, the study also found that replacing these games with more creative and interactive options, such as Minecraft and Super Mario Bros., led to significant improvements in communication and behavior. This suggests that the type of game played is a critical factor in determining the impact of gaming on children with ASD (100–103).

The high prevalence of approximately addictive behaviors (54%) and full addiction (14%) among the study sample underscores the need for careful monitoring of gaming habits in children with ASD. Parents and clinicians should work together to set healthy limits on gaming time and encourage alternative activities that promote social interaction and skill development (104–106). The behavioral challenges and poor oral hygiene observed in children with ASD often necessitate specialized dental management, including conscious sedation or general anesthesia for more severe cases. This highlights the need for tailored approaches in both mental health support and dental care to ensure comprehensive well-being.

Conclusion

This pilot study provides valuable insights into the complex relationship between video games and ASD. While video games offer potential benefits for children with ASD, including improved social skills and reduced anxiety, they also pose significant risks, particularly in terms of addiction and negative behavioral outcomes. The findings suggest that the type of game played is a critical factor in determining the impact of gaming on children with ASD. By carefully selecting games that promote creativity, cooperation, and problem-solving, parents and clinicians can harness the positive aspects of gaming while mitigating its potential harms.

Future research should focus on developing and evaluating video game-based interventions that are specifically designed for children with ASD. These interventions should aim to enhance social skills, reduce anxiety, and improve cognitive functioning while minimizing the risk of addiction and negative behavioral outcomes. By doing so, we can create a more balanced and effective approach to using video games as a therapeutic tool for children with ASD. Beyond the psychological and behavioral impacts

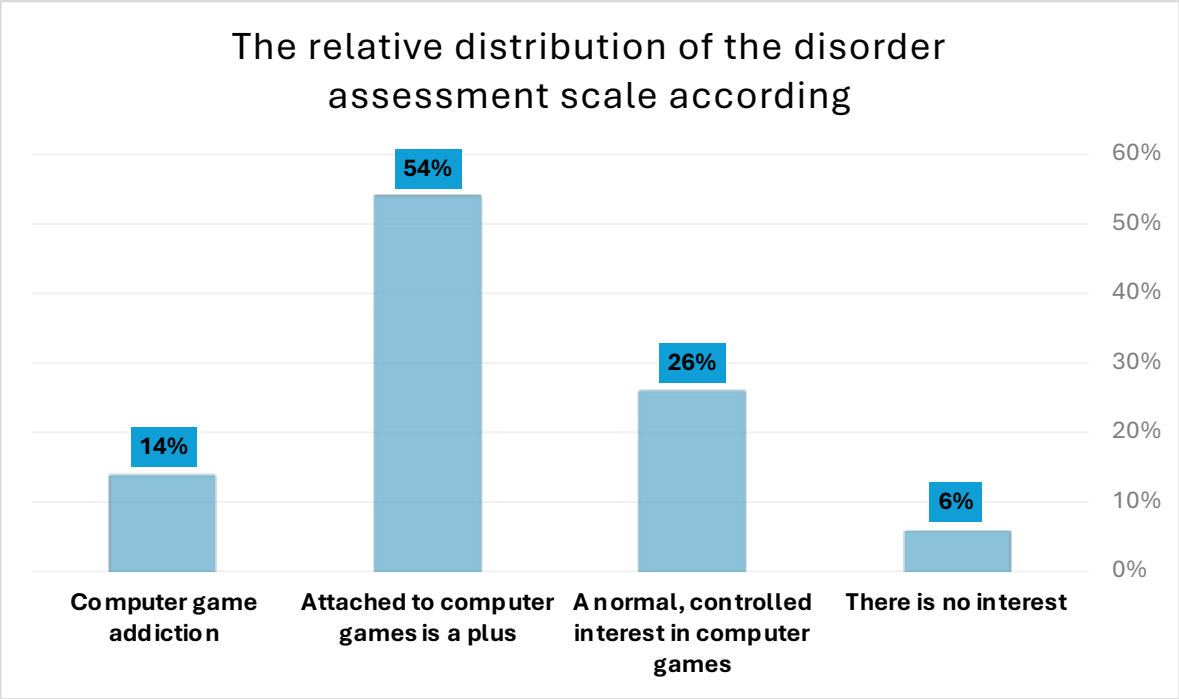

Figure 5. Level of video game addiction

of video games, children with ASD present unique dental care challenges due to poor oral hygiene and non-cooperation. Addressing their mental health and behavior could indirectly improve their ability to tolerate dental treatments, emphasizing the importance of an integrated approach to their overall care.

Abbreviations

AR: Augmented reality
ASD: autism spectrum disorder
ICD: International Classification of Diseases
VR: virtual reality

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