Spor Bilimleri Araştırmaları Dergisi
*Journal of Sport Sciences Research*
Vol: 10, Issue: 1, 2025
E-ISSN: 2548-0723
URL: http://www.dergipark.org.tr/jssr

# Children with Autism Spectrum Disorders' Use of Mobile Applications and Potential Interest in Digital Games

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**Research Article**
Received: 01.11.2024 Accepted: 28.02.2025 **DOI: 10.25307/jssr.1577685**
Online Published: 28.02.2025

## Abstract

This study aims to examine the impact of these tools on children with Autism Spectrum Disorder (ASD) from the perspectives of parents and sports educators by examining in depth the use and purposes of mobile applications and digital games by children diagnosed with ASD. This study was conducted using phenomenology design, one of the qualitative research methods. The participants, determined by criterion sampling method from the purposive sampling method, consisted of parents of children with ASD and sports educators. Data was collected through semi-structured interviews, and data saturation was reached with eight parents and nine sports educators. The data were analyzed by constant comparative content analysis. The findings of the study show that children with ASD have a high interest in digital games and that this interest should be directed in a positive direction. While parents stated that their children generally use general-purpose applications, sports educators emphasized that the interest of children with ASD in digital games has increased with the impact of the digital age. All participants stated that digital games should be individualized and educationally focused. The importance of controlled use of digital games while contributing to social, academic and motor skills was emphasized. As a conclusion, the interest of children with ASD in digital games should be carefully guided. Individualized designs can support their development. Mobile platforms are becoming critical with ease of access and education-oriented content. Therefore, it is recommended to develop strategies for safe and controlled use.
**Keywords**: Autism Spectrum disorder, Digital games, Mobile application

# Otizm Spektrum Bozukluğu Tanısı Almış Çocukların Mobil Uygulama Kullanımı ve Dijital Oyunlara İlgi Potansiyeli

## Öz

Otizm Spektrum Bozukluğu (OSB), sosyal iletişimde bozulmalar ve tekrarlayıcı davranışlarla karakterize edilen nörogelişimsel bir bozukluktur. OSB'li bireylerin gelişimlerini desteklemek amacıyla eğitim ve terapi süreçlerinde dijital oyunlar ve mobil uygulamalar giderek daha fazla kullanılmaktadır. Bu teknolojiler, özellikle sosyal, bilişsel ve motor becerileri destekleme potansiyeline sahiptir. Bu çalışmanın amacı, OSB tanısı almış çocukların mobil uygulama ve dijital oyunları kullanım durumlarını ve amaçlarını derinlemesine inceleyerek, bu araçların OSB'li çocuklar üzerindeki etkisini veliler ve spor eğitimcilerinin bakış açısıyla incelemektir. Bu çalışma, nitel araştırma yöntemlerinden fenomenoloji deseni kullanılarak gerçekleştirilmiştir. Amaçlı örnekleme yönteminden ölçüt örnekleme yöntemi ile belirlenen katılımcılar, OSB'li çocuklara sahip veliler ve en az iki yıl OSB'li çocuklarla çalışan spor eğitimcilerinden oluşmaktadır. Veriler, yarı yapılandırılmış görüşmelerle toplanmış, 8 veli ve 9 spor eğitimcisi ile veri doygunluğuna ulaşılmıştır. Sürekli karşılaştırmalı içerik analizi ile incelenmiştir. Araştırma bulguları, OSB'li çocukların dijital oyunlara olan ilgisinin oldukça yüksek olduğunu ve bu ilginin olumlu yönde yönlendirilmesi gerektiğini göstermektedir. Veliler, çocuklarının genellikle genel amaçlı uygulamalar kullandığını belirtirken, spor eğitimcileri OSB'li çocukların dijital oyunlara ilgisinin dijital çağın etkisiyle arttığını vurgulamıştır. Tüm katılımcılar, dijital oyunların bireyselleştirilmiş ve eğitim odaklı olması gerektiğini belirtmiştir. Dijital oyunların sosyal, akademik ve motor becerilere katkı sağlarken kontrollü kullanılmasının önemi vurgulanmıştır. Sonuç olarak, OSB'li çocukların dijital oyunlara ilgisi dikkatle yönlendirilmelidir. Bireyselleştirilmiş tasarımlar gelişimlerini destekleyebilir. Mobil platformlar, erişim kolaylığı ve eğitim odaklı içerikleriyle önemli bir ihtiyaç haline gelmektedir. Bu nedenle, güvenli ve kontrollü kullanım için stratejiler geliştirilmesi önerilmektedir.
**Anahtar kelimeler:** Otizm, Spektrum bozukluğu, Dijital oyunlar, Mobil uygulama

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## INTRODUCTION

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder for which there is currently no effective treatment and is characterized by impairments in social communication and repetitive behaviors (Lord et al., 2020). This growth begins with changes in social permissions and prolonged changes in language characteristics (Lord et al., 2020). According to research, the time, experience, and money that families of children with ASD spend on it over the years indicate a severe financial burden on both families and society (Liu & Shen, 2023). For example, the estimated total (personal and societal) lifetime cost of supporting an autistic person without an intellectual disability is 1.4 million US dollars (Rogge & Janssen, 2019). Recent studies show that the global prevalence of ASD is significantly increasing. In the United States (US), according to the 2020 system of the Centers for Disease Control and Prevention, approximately 1.68% of children are estimated to have an ASD diagnosis (Centers Disease Control and Prevention, 2022; Hodges et al., 2020). Recent studies reveal that the prevalence of ASD has increased by 0.6% globally (Salari et al., 2022). With this increase, technological procedures and (Çakıl & Piyal, 2023) digital games (Atherton & Cross, 2021; Tsikinas & Xinogalos, 2019) are increasingly preferred by researchers and experts as an effective intervention for the prevention and treatment of ASD. In the literature, the high prices of traditional education methods and the inability of ASD patients to gain the necessary storage in this region have become critical in the education and daily lives of these countries in the technological country. Especially during the COVID-19 pandemic, access to technological education options such as tablets, has become inevitable (Cebeci & Yenen, 2022; Chen et al., 2020). While the pandemic process has seriously affected the living order all over the world, the closure of many educational centers for children with ASD has led to these children being deprived of the educational programs and exercises they regularly attend (Chen et al., 2020). This has increased the risk of diabetes, obesity and heart disease in individuals with ASD, as physical activity levels remain low (Parsons et al., 2024; Van Lerberghe, 2008). In addition, the gap created for students who stayed away from the traditional education environment was rapidly filled with distance education and online education processes came into play (Yılmaz et al., 2022). For this reason, digital game programs have been developed that minimize face-to-face intervention. For example, The Ministry of National Education offers a total of 55 game activities under 11 main categories in its mobile application named 'Özelim Eğitimdeyim' to support students and parents in the field of special education (Milli Eğitim Bakanlığı, 2020).

In literature, many researchers have given importance to web-based physical activity interventions that offer advantages such as high efficiency, easy applicability, low cost, and no regional limitations (Esentürk & Yarımkaya, 2021; Lindgren et al., 2016; Liu & Shen, 2023; Yarımkaya et al., 2023), and various types of gamified education via mobile applications. For example, Hanaylı et al. (2015) designed an “Android Application for Improving Social Skills of Children with Autism”. The authors reported that the burden of individuals caring for children with ASD was also relieved through the application. Yaman (2018) also developed a mobile application for teaching mathematics to children with ASD and concluded that the mobile application was influential in developing mathematics skills in children with ASD. Papoutsi et al. (2018) examined mobile applications to improve emotional intelligence in ASD, and the authors stated that mobile applications can create new options and opportunities for programmers to create innovative teaching content suitable for different student groups and

learning styles. Özcan et al. (2022) addressed fundamental issues, including first aid, within the scope of a game-based augmented reality application. They reported that a single type of approach is not suitable for children with ASD. Penev et al. (2021) developed a mobile game platform to improve social communication among autistic children. The study results showed that the mobile game "GuessWhat" offers a feasible approach to the effective treatment of autism and supports the possibility of using the game in natural environments to increase access to treatment, especially when there are barriers to care. Recent studies have also shown that mobile applications have increased and offer various suggestions on how these applications can be used more effectively for individuals with ASD. Rehman et al. (2021) suggested developing mobile applications with progress tracking, personalized content presentation, automatic reasoning, image recognition, and natural language processing technologies. They also stated that application accessibility and individualized support are key elements supporting the development of children with ASD. In this regard, Jaramillo-Alcázar et al. (2022) proposed a mobile application method for individuals with ASD; they reported that applications for various areas such as communication and language, emotions and social behaviors, games and entertainment, and support tools have great potential for children with ASD and can make significant contributions to their education and development processes. In addition, Moraiti et al. (2023) argue that such applications can potentially strengthen areas where autistic individuals are lagging.

Looking at the sample applications in the literature review studies, it is seen that various applications developed for communication, education and emotional development aim to support the skills of individuals with autism. Proloquy4Text and Proloquo2Go enable text-based and visually supported communication, while Assistive Express facilitates communication with symbols. Avaz FreeSpeech enables individuals with speech difficulties to form grammatically appropriate sentences. Apps such as Keeble, which supports social skills development, and Choiceworks, which facilitates planning daily routines, encourage individuals to lead a structured life. Miracle Mode improves cognitive and motor skills by offering therapeutic support. FlummoxVision and Injini, targeting visual processing difficulties, are digital storytelling apps that develop creative expression skills. Pictello supports activities of daily living. Emergency Chat, which provides fast communication in emergencies, and Autism Apps, which brings together various autism-related applications, offer digital resources that users need (Moraiti et al., 2023). Vale-Emotions (Olmedo-Vizueta et al., 2017), which improves emotional recognition skills, and BUITTIS, Numbers and Counting, Learn with Rufus and Mental Imagery Therapy for Autism (MITA) applications that support cognitive development aim to increase the academic and cognitive skills of individuals with autism (Aziz et, al., 2019). In addition, robot-assisted therapy studies improve the cognitive and social skills of individuals with autism on mobile and web-based platforms (Ilijoski et al., 2022).

In order to effectively develop educational and therapy strategies for ASD, it is of great importance to understand and support how children with ASD can learn and develop through digital tools and games, especially considering the culture they live in. The opinions of parents and sports educators about these technologies can determine their roles and participation in their children's use of technology. The aim of this study is to examine in depth the use of mobile applications and digital games by children diagnosed with ASD and to explore the

effects of these tools on children with ASD from the perspective of parents and sports educators. The findings may help parents and educators understand how to use technology more efficiently in the education of children with ASD. This may contribute to the development of more effective strategies for the overall development of children with ASD.

## METHOD

### Research Model

In this study, phenomenological design, one of the qualitative research methods, was used to examine the experiences of parents and sports educators regarding the use of mobile applications and interest in digital games of children with ASD in detail and depth. In this way, it will enable us to understand what mobile applications and digital games mean to children with ASD from the perspective of families and sports educators of children with ASD, the reactions of children with ASD to digital games and mobile applications, their usage habits, the difficulties they experience and their positive and negative experiences (Yıldırım & Şimşek, 2013, pp. 78-79).

### Study Group

In phenomenological studies, the most valid source of information about reality is individuals who directly experience the experience. For this reason, the criterion sampling method, one of the purposeful sampling methods, was used in the selection of the study group of the research (Yıldırım & Şimşek, 2013, p.140). The criteria for being selected as a participant are being a parent of a child with autism, and their child is between the ages of 6-12 (when the literature is examined, it was seen that digital technologies are applied between the ages of 6-12). Another data source is sports educators. Sports educators should have provided sports education to children with ASD for at least 2 years, actively work in an institution, and work with the 6-10 age group with ASD (Barrios-Fernández et al., 2022; Macoun et al., 2022; Rafiei-Milajerdi et al., 2020). The names of the parents (8 parent participants) and sports educators (9 participants, sports education experts) participating in the research were concealed, and code names were given to the participants according to ethical rules. The parents' ages participating in the research ranged from 35 to 58. Their educational backgrounds are primary school (2), high school (3), and undergraduate (3). Family incomes are middle (5) and upper level (3). Children with ASD receive sports education for at least 2 years and a maximum of 10 years. The ages of sports educators vary between 30 and 45. Their working periods are 3 to 15 years. Their education level is undergraduate.

### Data Collection Tools

This study used a semi-structured interview form to collect data from parents and sports trainers. In this way, the participants' perspectives, experiences, and opinions were presented in detail (Yıldırım & Şimşek, 2013, p. 155). First, a literature review was conducted on the subject, and a semi-structured interview form was created based on the information obtained. To ensure the content and scope validity of the form, the prepared form was presented to three experts for their opinions. Then, three pilot interviews were conducted, with each data source, and the semi-structured interview forms were finalized. Sample questions for parents are as follows: Do you use technology tools to support your child's development? What do you think

about your child's interest in technology, and their ability to use technology? (Is there a digital game or similar activity they use?) How do you think your child benefits from existing digital games, and applications? What types of games or applications interest them? What kinds of applications do you think your child can benefit from to support their physical, cognitive, and emotional development? Sample questions for sports educators are as follows: What are your observations about children's interest in digital games? What are the behaviors that children exhibit while playing games, do you believe that these applications are suitable for children's physical activities? Why? Do you think offering digital games through a mobile application would be beneficial?

### Data Collection

Data was collected by two researchers in this research. Special education and rehabilitation centers in different cities in Turkey were reached via e-mail, and information about the research was provided. In addition, a special children's festival was held in Istanbul, and volunteer parents of children with ASD and sports education experts (suitable for criterion sampling) were interviewed. Individual interviews lasted an average of 45-55 minutes and were recorded with the parents' approval. Data saturation was reached with eight parents and 9 sports trainers.

### Data Analysis

The responsible researcher transferred the raw data obtained to the electronic environment. Two researchers deciphered the data and read until familiarity with it was gained, then coded and categorized it. Codings between experts showed 0.85 agreement. Accordingly, 0.70 and above is accepted as indicating excellent agreement and acceptable reliability (Yıldırım & Şimşek, 2013, p. 265). It was analyzed using the constant comparative content analysis method. Because the themes were created by comparing the opinions of parents and sports trainers (Yıldırım & Şimşek, 2013, p. 260), in this direction, three main themes emerged: (1) Child's use of mobile applications and interest in digital games, (2) Expectations and observed behaviors regarding children's gains from digital games, (3) Necessity of a mobile application including a digital game program.

## FINDINGS

### Children's Mobile Application Use and Interest in Digital Games

### Findings Obtained from Parents

According to the data obtained, all participating parents stated that their children with ASD are highly interested in and enjoy digital games. However, they said that there is no specific application suitable for children with ASD and that they generally use general-purpose applications. Parents indicated that their children use technology on platforms such as YouTube for cartoons, Keloğlan, Pepe, Fox, Mario, football manager games, sports-themed games, jumping games, puzzles, songs, music, dance, two-player games, and video recording. Parents stated that their children also enjoy watching the TRT-Çocuk channel. They also said they support their children using technology for reasons such as the pandemic, limited access to sports education, fatigue, inability to spare time for themselves, saving time, keeping their children entertained, and supporting their education. Some parent opinions are as follows:

*P1: There is no application specific to individuals with autism that is game-oriented and has customizable features, or if there is, I don't know about it. Since schools were closed during the pandemic, my child uses his phone a little more. He usually plays games on his phone and also uses YouTube. He enjoys it.*

*P2: I noticed for the first time that my child saves his subscriptions on YouTube and creates a list for himself; I didn't know that. He watches content like Keloğlan on TRT Çocuk. We can find it on web browsers like YouTube, Google, Google Play Store, and the App Store.*

*P4: He figured out some things independently, like making videos. He plays games and prefers sports-oriented games because of some activities we do together. He likes Mario-style jumping games, and he also plays puzzle-solving games. He has difficulty with two-player games, but I help him. No application specific to my child can adjust the difficulty level and give him feedback, but there definitely should be such an application, right?*

*P8: My child has no friends; I am his only friend. I care for him 24 hours a day, and he gets tired too. Sometimes, we give him the phone or tablet so he can get away from me for a bit, and we can both rest.*

*P7: He also learned to think strategically, thanks to puzzle games. These games support his education, and we don't have any problems as long as he doesn't overdo it.*

**Findings Obtained from Sports Educators**

According to educators, children with ASD show great interest in digital games, regardless of their type, at school or in the educational environment. Educators explain this situation as the influence of children's social environment, families, and living in a digital age. The game features that attract the most children's attention include violent content, characters, sound effects, cyclical games that follow each other, colorful and animated scenes, lots of music, and fast-changing images. According to sports educators, families support their children's use of technology. However, educators state that some platforms offer digital games, but they think that these platforms are not entirely suitable for the characteristics of ASD and state that their negative aspects outweigh their positive aspects. Some educators' opinions are as follows:

*P3: Children are very interested in digital games because we live in a digital age. Games that involve shouting and violence are among the types that attract their attention the most.*

*P4: If families allow, children are interested in games that revolve around and follow each other.*

*P9: Our children's addiction to digital environments has increased. The factors that encourage this situation include advertisements, friends, and similar reasons. In addition, the preparation of games with colorful themes also increases this interest.*

*P8: While these games can be used as a free time activity, parents often avoid dealing with their children's behavioral problems and push them into the lap of digital games.*

*P6: Children are interested in digital games like all other children; however, it is debatable how suitable these games are for the characteristics of ASD. These children are unique individuals and each child with ASD has different individual needs.*

## Expectations and Observed Behaviors Regarding Children's Gains from Digital Games

### Findings Obtained from Parents

According to the opinions of the parents, children with ASD should participate in sports-related activities to develop their communication skills, social interaction, emotional regulation, and motor skills. In addition, it is essential to provide these children with self-care skills, support their daily life skills, and teach them how to cope with sensory stress. In this context, it is emphasized that especially artificial intelligence-supported games and individualized cognitive exercise programs should be used for children with ASD. These programs can contribute to the multifaceted development of children by being designed according to their individual needs. Therefore, the parents stated that digital transformation is essential. The parents stated that digital games can be helpful for language development, social development, and motor skills development. Some parent opinions are as follows:

*P2: I used to take them to swimming and language therapies, but we have been unable to do these activities for the last two years due to financial reasons. Rehabilitation classes generally focus on language, speech, matching, and line studies. I want to support these activities with digital games at home, which could effectively develop my child's language skills.*

*P8: The gains regarding communication, social interaction, emotional regulation, and motor skills development can be achieved through cartoons.*

*P6. I want my child's self-care and daily life skills to be supported.*

*P3: It would be nice to be able to correct behavioral problems with cognitive individualized exercise programs.*

*P4: I encourage my children; they also have fun. Artificial intelligence and technology are increasingly at the forefront today. If these applications are specific to my child, they can improve their academic skills. This is important for education, and I advocate that such applications be available everywhere.*

### Findings Obtained from Sports Educators

Sports educators stated that children with ASD who play digital games that their families allow without control exhibit negative behaviors. They noted that these children's aggressive behaviors increase, mood disorders occur, and stereotypical behaviors become more frequent. Six participants stated they use digital game applications for educational purposes when working with children with autism. However, most participants said they want to use digital platforms in a controlled manner. Three participants said that they do not use such games because they think that learning will occur through experience and will not contribute positively to children with ASD. Some educator opinions are as follows:

*P1: I use digital game applications in a controlled manner; when I am going to teach something, I first show a video of that subject. This method reduces learning anxiety and helps the child understand learning. For example, we watch a video teaching how to shoot a basketball. I do not want the child to trigger certain stereotypical behaviors.*

*P3: There were times when I used digital games. For example, I played these games with children with poor balance and coordination. They had fun and did physical activities without getting bored.*

*P9: The child's willingness to be in the environment or the game, being curious, and constantly thinking and searching for solutions during the game contribute to education. However, aggressive behaviors*

*increase in children who use digital games uncontrollably and without limits. The quality of the games is essential; such games with harmful content should not be used.*

*P8: Digital games and applications can have an important place in the development of individuals with ASD. However, it is necessary to consider whether they are suitable for the child's age, gender, language development, social relations, intelligence, and creativity or whether they will develop these characteristics. For example, we can use games and applications to teach essential life skills such as numbers, colors, and shapes to individuals with ASD. In addition, if the child with ASD can express themself, gap-filling, and dialogue applications can be used. While doing attention studies, we can target skills such as object tracking, finding the differences between two pictures, or designing clothes.*

*P7: Yes, I use digital games and have received positive contributions. For example, using the Wordbit application for English helped me learn words quickly and helped me gain speaking practice.*

*P6: I don't use it. The child will learn by doing, not by watching.*

**Findings Obtained from Parents:**

According to the findings obtained from parents, it is seen as a necessity to present digital games to children with ASD through a mobile application. However, these digital games should target social and physical development and include educational and cognitive exercises. In this direction, digital game content should consist of the following: educational games, storytelling, games that can be imitated, programs that support language development, rhythmic dance with music, matching games, reading activities, colors and numbers, and features that can be adjusted according to the level of difficulty.

In addition, football manager games, English learning applications (e.g. Duolingo), strategic games, and puzzles that can be adapted to their daily lives, as well as movement-oriented games, should be designed as strategic games that encourage children to understand and react to the visuals on the screen. Some parent opinions are as follows:

*P1: Such applications can be beneficial for support purposes, especially when we cannot participate in sports or other activities. For example, when I try to dress my child in the morning, he cannot put on his T-shirt and pants correctly; he can put his T-shirt on inside out. He cannot distinguish between front and back. It isn't easy to teach him with instructions, but he can learn faster with visual methods and applications, such as cartoons. Some children can comb their hair and brush their teeth on their own. Therefore, applications supported by artificial intelligence can be pretty helpful. However, it would be logical to set limits, such as 15 minutes, to keep the usage time short and to prevent the applications from creating addiction.*

*P8: My child can dance with him when he says, "Let's dance together." He especially likes exciting and lively songs. For example, he has memorized the song Kukuli and loves it very much. He likes fast things; he laughs and enjoys it when the car goes fast. If there were an application supported by artificial intelligence, I would love a program to help my child learn and adapt to his movements.*

*P2: Instead of working with cards in language therapy, it would be more effective to provide education with speech and instructions through the application. While my child used to watch folk tales such as Keloğlan and the Fox, he has now started to turn to music and rhythm. He accompanies lively rhythms and shows interest in dancing. Listening to music has become an essential activity for him. My wife and I thought of something useful, but since my child does not use headphones, we did not have the opportunity to try this application.*

*P5: Instead of my child watching cartoons until the evening, I would like him to do something interactive. For example, an application that includes speaking, matching, reading activities, colors, and numbers could be helpful. For instance, if Keloğlan danced and my child imitated him, he would like it because his imitation skills are pretty high. If we can adjust the difficulty level in such an application, we can provide my child with an appropriate level of learning.*

*P4: Puzzle games have become an essential tool for developing strategic thinking. For example, he learned to develop strategies and imitation skills in football manager games here. Therefore, watching and following my child on a platform-specific to him and supporting his development would be precious. Puzzle-oriented, movement-oriented games should be designed so that he can understand and react to the visuals on the screen. Such games can provide support in daily life and replace aggressive games. A mobile application with digital games or exercises specific to ASD would be handy.*

*P3: My child already spends time on the phone. These types of applications can at least be a more favorable alternative. Would this application be helpful for us? What should we do better? If you guide us in this regard, we can be more productive for my child. The safety and educational value of digital applications for children are significant to me. Music-based programs like TikTok can be dangerous for children. That's why I make the content educational and instructive. I see how compelling characters like Pepee, Kukuli, and Caillou are in helping children gain habits like toilet training.*

**Findings Obtained from Sports Educators**

According to the findings obtained from the educators, digital games to be offered to children with autism can be given via a mobile application. However, the content of these digital games, how they are used, and personal data privacy, are essential for all participants. Some educator opinions are as follows:

*P9: If we use these applications for our intended use, they can be helpful. It will benefit an individual who wants to do sports to use a 30-day sports program application. However, the most important thing here is that everyone should be made by considering parameters such as age and physical condition. Technology serves our purpose. First of all, we should be aware of this. Of course, it is an excellent situation to offer valuable things to us.*

*P6: It will be fine if used in a limited and correct way because, under supervision, it would be good for them to play games that are at least more educationally controlled and explicitly designed for them in their lives. However, even if the child has their profile and password, the family should be supervised. This would be good; real-time data can be collected during the game, and the games should be adjusted from easy to difficult according to the child.*

*P7: Since they play digital games so much, it would be productive to implement more educational games through mobile applications and under supervision. Privacy should be a priority in mobile applications. Privacy of personal data is essential.*

## DISCUSSION AND CONCLUSION

The aim of this study is to examine in depth the use of mobile applications and digital games by children diagnosed with ASD and to explore the effects of these tools on children with ASD from the perspective of parents and sports educators. The data obtained show that children with ASD show a high interest in digital games and that this interest should be directed positively. Digital games developed with individualized designs can support the development of socio-communication, academic, and physical skills. Sports educators emphasize the careful use of such applications and observe the characteristics of children with ASD. Mobile platforms are becoming a great need with the advantages of ease of access and providing education-oriented content. These applications support the development of children and provide an effective monitoring and intervention tool for parents and educators.

The literature indicates that analog and digital gamified interventions developed for individuals with ASD to support their educational process target three main areas: socio-communication skills, academic skills, and physical skills (Atherton & Cross, 2021). This situation is also supported by studies in this field (Esentürk & Yarımkaya, 2021; Lindgren et al., 2016; Liu & Shen, 2023; Yarımkaya et al., 2023). The literature provides other examples, such as Çattık (2016), who used the graduated assistance method on a smart board to develop the digital game skills of children with ASD and demonstrated that this method contributed to their learning of digital game skills. Aydemir and Sani-Bozkurt (2021) and Ergün-Elverici and Taymaz-Sarı (2021) reported that computer-aided applications positively affect the education of children with ASD, primarily to support the development of communication, game, and social skills. Keskin (2023) emphasized that teaching imitation skills with models presented in the digital environment is effective in children with ASD. Çakıl and Piyal (2023) supported these findings by stating that innovative technologies can potentially improve the quality of life of individuals with ASD.

Parents recommend that children with ASD benefit from digital games and individualized cognitive exercise programs to support communication, social interaction, emotional regulation, motor skill development, self-care skills, daily living skills, and ways to cope with sensory stress. In this context, game and exercise contents should be adjusted according to difficulty levels, such as educational games, storytelling, games they can imitate, programs that support language development, rhythmic dance with music, matching games, reading types, colors, and numbers. In addition, football manager games, English learning applications (e.g., Duolingo), strategic games, and puzzle and movement-oriented games should be offered by adapting them to their daily lives. It is emphasized in the literature that digital games produce promising results for individuals with ASD (Atherton & Cross, 2021; Tsikinas & Xinogalos, 2019). For example, the Collaborative Puzzle Game by Battocchi et al. (2009), and the imitation game performed by Wainer et al. (2014) with the robot KASPAR are examples of developing game interventions on digital platforms for individuals with ASD. These games demonstrate the potential of technology to stimulate the imagination of players with ASD and offer the advantage of creating social experiences compared to more ordinary gaming platforms (Atherton & Cross, 2021). Sports educators in this study reported that parents of children with ASD are uncontrolled in terms of technological methods and digital game use. It was stated that children are interested in games that include aggression, which leads to increased problem

behaviors. Therefore, according to the participants, it is emphasized that some limitations should be imposed on the use of digital games for individuals with ASD. In this context, it is recommended that they are not exposed to sensory stress; factors such as light, color, and sound should be adaptable, aggressive games should be avoided, they should be played under supervision, and time limits should be applied. The views of sports educators in this study are supported in the literature. According to Craig et al. (2021), internal (gender, attention, and oppositional behavior problems) and external factors (social factors, access, video playing time, parental rules, and game type) are essential determinants of problematic video game use by children with ASD. According to Saeedi et al. (2022), although digital games have positive effects on language and speech skills, feelings of frustration, low self-esteem due to failures while playing games, environmental noise, conflict between game levels and the needs of the target group, and problems with speech recognition may also be experienced. Therefore, obstacles and difficulties should be considered before designing these tools, and solutions should be suggested. In their systematic review, Eltahir et al. (2025) stated that digital games pose a risk for children with ASD and that the variables predicting this risk include being male, puberty, co-occurring Attention Deficit Hyperactivity Disorder (ADHD) symptoms, lack of parental rules, parent-child conflict, and high parental stress. However, due to methodological limitations in these studies, clinical studies are needed that distinguish excessive gaming and internet use behaviors from impaired control (i.e., addiction) or autism characteristics (i.e., limited interests) (Eltahir et al., 2025).

Both parents and sports educators emphasize that designing a mobile application that will offer programs for children with ASD can solve limited sports opportunities, especially for parents. The usability of this application, ease of access, time limitation, security, and privacy are essential requirements. In addition, the games are expected to be organized specifically for the child by collecting real-time data during the game. Various studies in the literature on gamified education types via mobile applications exist. For example, Hanaylı et al. (2015) focused on improving the social skills of children with ASD, while Yaman (2018) conducted studies on teaching math to children with ASD. The findings show that the interest of children with ASD in digital games should be directed positively. In this direction, it may be possible to support socio-communication, academic and physical skills through digital game applications developed with individualized designs. In this context, mobile applications developed for children in need of special education also have an important place. For example, the Ministry of National Education offers a total of 55 game activities under 11 main categories in its mobile application named 'Özelim Eğitimdeyim' to support students and parents in the field of special education (Milli Eğitim Bakanlığı, 2020)."However, some critical points should be considered in the development of such applications. As a matter of fact, it was determined that many criteria such as age, type of disability, adaptation and duration were not sufficiently taken into account during the design process of the “Özelim Eğitimdeyim” application (Yılmaz et al., 2022). This situation reveals that a more inclusive approach that emphasizes special needs more in the design of digital games should be adopted. As emphasized in the literature, some basic elements should be taken into consideration in the design of digital games developed through mobile applications. The guidelines prepared in this direction reveal that multimedia elements (text, visuals and sounds) and application features (interface, navigation, customization and interaction) should be tailored to children with ASD. It is stated that the texts used in the applications should be simple and understandable, the visuals should be appropriate and close

to real life, and the sounds should be familiar and comforting to the user (Gallardo-Montes et al., 2021; Stathopoulou et al., 2019; Zamry et al., 2022).

In conclusion, the appropriate design of multimedia elements and application features in mobile platforms for children with ASD can become an important tool that supports children's development by providing easy access, individualized support and educational content. However, this study has some limitations. ASD is a heterogeneous group; therefore, a larger sample group is needed. The findings may not be fully representative of the ASD population and it was assumed that the participants answered the semi-structured questions to the best of their ability. To confirm the findings and support the conclusions, experimental studies are needed to determine the positive and negative aspects of mobile applications that include individualized digital games for children with ASD. It is also recommended that designs and applications developed for children with ASD should be tested with larger groups.

**Conflict of Interest:** There is no personal or financial conflict of interest within the scope of this study.

**Authors' Contribution:** Study Design- SA; YEE; EBY, Data Collection- SA; RD; EBY, Statistical Analysis and Manuscript Preparation- SA; RD; YEE; EBY, All authors read and approved of the final manuscript.

**Ethical Approval**
**Ethics Committee:** Rumeli University
**Date:** 05.06.2024
**Decision No:** E-53938333-050-39343

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