

Research Article

The Effectiveness of the Play Attention6 Program in Reducing Attention Deficit Hyperactivity Disorder (ADHD) in a Sample of Students with Special Needs

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Abstract

The aim of this study was to verify the effectiveness of the Play Attention6 program in treating attention deficit hyperactivity disorder (ADHD) in specific groups of children with special needs. The study focused on assessing how well the program could improve attention and reduce hyperactivity symptoms in children who are often marginalized in educational settings due to their unique learning challenges. The sample consisted of 30 students, including ten children with learning disabilities, ten deaf children, and ten children with mild mental disabilities, all of whom were enrolled in primary school (grades one through six) in Al Arish, Egypt. The participants were carefully selected based on Al Hamidi's diagnostic list for distraction and hyperactivity, a tool used to identify children with characteristics of ADHD. The Play Attention6 program was implemented over a specific period, and its impact was measured by comparing students' performance before and after the intervention. The study employed a quasi-experimental design with pretest and posttest evaluations. The results revealed statistically significant improvements in the attention and behavioral control of students across all three categories after the application of the program. Specifically, the posttest scores indicated a marked decrease in hyperactive behaviors and an increase in sustained attention. These findings suggest that the Play Attention6 program can be an effective intervention tool for managing ADHD-related symptoms in children with diverse special educational needs, highlighting its potential for broader application in inclusive educational environments.

Keywords

Computer Games, Play Attention6, Attention Deficit, Learning Disabilities, Deaf, Mild Intellectual Disability

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1. Introduction

Children with Attention deficit hyperactivity disorder is characterized by the inability to organize their appropriate behavior in the classroom and as well as their inability to complete a task to the end or reach the goal; also, they engage in activities unrelated to educational tasks. They rarely participate in school and classroom tasks, and when they do participate in activities with their colleagues, their behavior is inaccurate [2, 6]. The child is often identified between 5 to 9 years old, and symptoms persist in childhood and adolescence. Moreover, some or all of the symptoms may persist in (30 - 60%) of cases into adulthood [4].

Children with attention deficit hyperactivity disorder (ADHD) are unable to focus on obtaining information, and the findings of [12] demonstrated a correlation between developmental delay in the process of selective attention and maintaining its continuity for a period of time. This is a common problem for people with special needs.

Because of the attractiveness of computer games to school-age students, many technology companies have taken care of different forms of computer games to achieve an educational aim in light of what certain studies have shown concerning the continual increase in students with attention deficit hyperactivity disorder [17]. Computer games have been used successfully to treat attention difficulties because they offer a lot of good potential aside from entertainment, and there has been a lot of success when games are tailored to address a specific problem or teach a certain skill [20].

According to [16], the increasing use of technology in teaching causes changes in the learning and teaching processes and applications, as well as improving student learning performance, because anything we do on a computer that causes fun and attention is called a game, so computer games have become the name used to describe a group of extensive experiences using digital media Games-to-Teach team. Although computer and video games are regarded as entertainment, they are also a powerful educational tool, prompting us to use computer games as a way to express various messages and tools to develop new effective learning chances [26].

Murphy discovered that computer video games can help to create and improve momentary attention, increase the distribution of spatial attention, and improve the ability to pay attention in information processing and focus [24]. In the Arab world, [1] determined the prevalence of ADHD and psychological and social factors in a sample of 1287 Dammam primary school students, using a variety of questionnaires. According to the findings of the study, the prevalence of hyperactivity was 12.4%, while the incidence of attention deficit was 16.3%. According to [36], ADHD is the most common neurobehavioral condition in children, affecting roughly 5.5 million children.

Nevertheless, with the tremendous technological development, new generations of purposeful brain games such as Play Attention6 have emerged, as a possible

non-pharmaceutical alternative to addressing the academic participation of students, which was employed by the study of [24]. The study sample consisted of students fifth to eleventh graders ($n = 10$) who were diagnosed with ADHD. For five weeks, participants were required to spend at least 20 minutes playing "brain games" every morning before school. An EEG, parent-teacher reports, researcher observations, and participant self-reports were used to measure participation at three different time points. The findings suggested that ADHD adolescents' executive function and attentiveness can be improved with regular usage of brain games.

Given the enormous amount of time that kids and adults all over the world spend with these media, computer game technology now has the ability to improve purposeful control over focused treatments. Computerized training or self-regulatory techniques also include fun games. It encourages the usage of games with a positive influence. For play to have a greater impact on developmental disorders, it is necessary to comprehend the components of play that improve attention and learning as well as the methods used by players. [4] and [35] also confirmed that attention deficit hyperactivity disorder (ADHD) has its effects on pupils' achievement and there are many programs based on effective computer games for treatment of distraction and hyperactivity through Play Attention. Students are monitored for concentration levels while wearing a helmet equipped with sensors that read and detect brain activity. This aids in the improvement of short-term memory, hand-eye coordination, discriminatory processing, and time on task as well as the development of attention skills and behavior modification. The findings showed that by making inattention visible through the various games of the program, the Play Attention program enables students to develop their own knowledge and increase attention, allowing them to strengthen these poor skills [31, 34].

NASA has developed an online Executive Focus Training System to enhance attention, memory, executive functions, and self-regulation. Play Attention6 is a full-service system that can be tailored to your specific needs. Play Attention6 employs the latest technology available to help you or your loved one develop the executive functions necessary to reach an individual's full potential and shape behavior without the need for punishment or discipline. Play Attention's unique and comprehensive approach to executive function training NASA-inspired technology + cognitive skills training + behavior shaping = skills that last a lifetime [33]. <http://spinoff.nasa.gov/>

Earlier studies that indicate an increase in the percentage of students with attention deficit disorder and hyperactivity, which negatively affects academic achievement, such as [35, 33, 24, 36, 20, 18], it was found that there is an urgent need for the role of modern technology for the Play Attention6 program in reducing attention deficit hyperactivity disorder for students with special needs to improve their academic achievement.

The importance of the study is crystallized in the extent of the need of different societies to benefit from the computer games program (play Attention6) in reducing attention deficit disorder among special education groups, especially the need of Egyptian society, by providing Egyptian society institutions with this program, especially in light of the spread of attention deficit hyperactivity disorder in Egyptian society.

1.1. The definition of Play Attention 6 Training Program

It is a computer-based attention training system that measures brain activity employing a strap worn around the arm, and provides visual and auditory feedback in a game-like environment designed to hone specific skills. To perform well in challenges and advance in the game, users must focus consistently during their weekly one-hour sessions, and improve their attention skills with training. Players receive incentive rewards after completing challenges, and a calendar feature allows them to schedule sessions and track progress [27].

<http://www.playattention.com>,
<https://www.additudemag.com/focus-techniques-for-distracted-children/>,

<https://www.ncbi.nlm.nih.gov/pubmed/24399101>,
<https://now.tufts.edu/articles/training-brain-focus>

There are extensive experimental studies that aim to know the effect of computer games in improving cognitive abilities among students. These studies include:

Chuang & Chen; Oei & Patterson; Prensky; Van Eck, determine to know whether playing computer-based video games helps kids learn cognitively. The results indicated that computer-based video games not only improve memory processes, but also enhance problem-solving skills through recognizing multiple solutions [10, 25, 26, 32].

According to [21], working with digital tools can help many children with learning disabilities discover new learning patterns that match their cognitive level. The built-in features of video games and other digital media are frequently highly useful teaching tools for kids with learning disabilities. These include video games or computer programs that are engaging and provide the sense of enjoyment these children need to succeed.

Findings of the study of [15] indicate that educational video games (serious games) have positive effects in improving motivation, attention and other cognitive components of students with learning disabilities. Through educational video games, it is possible to increase attention and reduce hyperactivity for students with learning difficulties. The use of Information and Communication Technology (ICT) is also everywhere. Technologies like video games have become very popular not only with the younger generation but also with the elderly. The video game industry has witnessed rapid growth in recent years, as well as interest in the impact of video game experience on people's daily lives.

A strategy for improving the development of cognitive skills, particularly memory and attention, is to train visual working memory (VWM) through the use of video games [19].

Basso et al; stated that the vast majority of joint attention interventions are for children with developmental disorders [5]. Despite these early interventions, which include teaching functional play to reinforce conditions that enhance learning, many young people do not develop attention in the early stages. He described this play as a unique form of experience in which both adults and children expend a lot of time and energy playing to technological applications that are meant to improve human cognition. [11] demonstrates that digital games are characterized by attracting the attention of players and preventing them from being distracted by the events taking place around them. The ability to quantify interest in the game provides a behavioral basis for measures of game participation and a link to existing research on interest. The study developed a new behavioral measure of gaming attention span, based on players' post-game awareness of irrelevant distractions that appear throughout the game. This is known as the Distractor Recognition Paradigm (DRP) which is an effective measure of how well autonomic games attract attention based on eye tracking. It is a higher measure of attention for recognizing distractions through playing games which can fully capture player's attention. Consistency of attention focus is modified by participation in the game and motivation to play serious games.

Shireet al; prepared a project for technology-assisted adaptations of effective personalized early intervention programs for young children with developmental disorders and has the ability to preserve resources while increasing access to specialized educational services and supports testing. Usability of online programs engage participants by aligning program navigation and content presentation with the needs and preferences of their target end users. Therefore, as part of the project, teachers will build technology adaption for evidence-based cooperative attention, symbolic play, participation, and organization [29].

The study of [23] identified Attention Deficit Hyperactivity (ADHD) as a common neurodevelopmental disorder in children. Previous research revealed that electronic training programs and attention-based brain-computer interface (BCI) could reduce the symptoms of ADHD. Since then, the study has developed a tablet version of the training program that can be paired with wireless EEG head-phones. In this trial, the study sample consisted of twenty children diagnosed with ADHD randomized to receive a tablet-based BCI intervention for 8 weeks either in the clinic or at home. The results indicated the effectiveness of the computer program and it helped the students' self-reliance and good attention.

In the same context, a group of literature supports the effect of cognitive training, especially games, in improving attention and behavior in people with ADHD. These studies include, but are not limited to: the study [14], the study [28],

the study [22], the study [37], and the study [25]. However, there are studies whose results indicated the absence of significant beneficial effects of computers in cognitive training for people with ADHD. These studies include: [8] and the study [13]. The researchers conclude from the outcomes of these studies that there is a difference in the effect of playing in general and computer games in particular in improving cognitive abilities and behavior in people with ADHD. This requires further subsequent studies to verify and confirm the effectiveness of games in improving cognitive abilities and behavior in people with ADHD.

2. Methodology

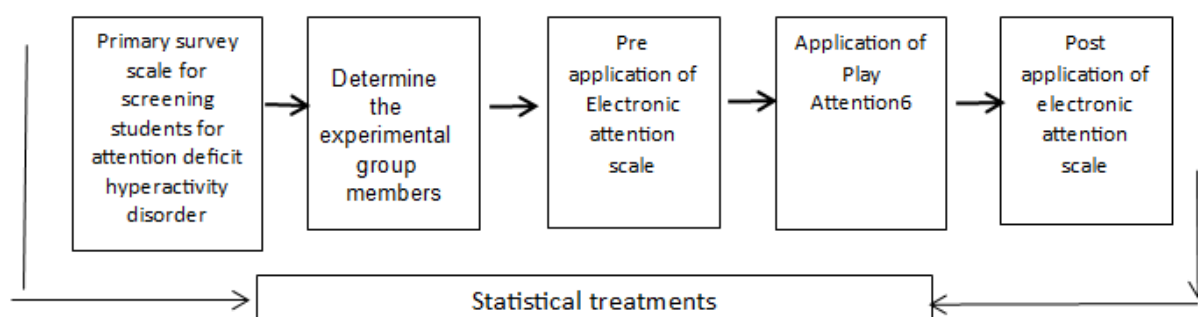


Figure 1. The experimental design used in the study.

The application phase and it includes selecting a diagnostic sample by a measure of attention deficit disorder and hyperactivity. The scale consists of (18) phrases within four estimates represented as rarely, sometimes, often and always.

The scale is arranged into odd and even items. The odd items reflect the pattern of attention deficit and the even items reflect the hyperactivity-impulsive pattern according to the instructions of the scale in its original form.

The appearance of six behavioral symptoms from the individual phrases means that the student has Attention and hyperactivity disorder.

3. Study Sample

The study sample included (30) children (10 deaf children - 10 children with learning difficulties - 10 children with mild mental disability) in the primary stage from the first grade to the sixth grade.

4. Ethical Considerations

Approval was obtained from The Ministry of Education and Special-Education in Egypt, (Al Arish Administration) before starting the research, and data was collected after ex-

1.2. Play Attention6 Training Program

It is a computer-based attention training system that measures brain activity using an armband and provides visual and auditory feedback in a game-like environment designed to hone specific skills. The on-screen game responds to a participant's attention state rather than a mouse click or joystick. To perform well in challenges and advance in the game, users must focus continuously during their weekly one-hour sessions, and enhance their attention skills with practice. Players receive incentive rewards after completing challenges, and the calendar feature allows them to schedule sessions and track progress [27].

plaining the study aim to parents and teachers who participated in the data collection.

5. Data Collection

Data was collected using Diagnostic list for distraction and hyperactivity prepared in the second term of the year 2023.

6. Study Tools

A number of tools were applied for the current study: 1- Applying the Attention Deficit Hyperactivity Disorder Scale and the developer (Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR®)) in its current Arabic dimensions is in the patterns of expression of the disorder: a pattern of inattention and a pattern of hyperactivity - impulsivity and a dual mode of inattention and hyperactivity. The scale consists of (18) paragraphs within four estimates representing: rarely, sometimes, often, always. Applying the standard by responding to the paragraphs - the classroom teacher who spent a period in teaching and dealing with the students from the participants for a period of not less than six months (Al Hamed, 2008). 2- Electronic Attention Disorder Diagnostic Scale (Bird Alert

Test) includes cognitive awareness of multiple stimuli and is divided into four levels: the first level is 3 degrees, the second level is 6 degrees, the third level is 9 degrees, and the fourth level is 12 degrees. The goal of the scale game is to help the bird reach its young and feed them. The method of measuring attention depends on avoiding risks by pressing the bird to stop it in case of danger.

<http://www.pomindcake.com/game/birds>
<http://www.pomindcake.com/game/twinsO>

7. Data Collection

Data was collected using Diagnostic list for distraction and hyperactivity prepared by Al Hamidi in the second term of

the year 2023.

Statistical analysis: Data was analyzed using a statistical package for social sciences, SPSS (2023) Wilcoxon (Z) for sample average.

8. Results

1. According to the first hypothesis:

There are statistically significant differences between the scores of the experimental group of students with disabilities (learning disabilities - deafness - intellectual disability) before and after applying the program in favor of the post-measurement on the Diagnostic and Statistical Manual of Attention Scale (DSM-IV-TR®)

Table 1. Wilcoxon (Z) for the sample average on pre and post application of (DSM-IV-TR) Scale for attention deficit rated for students with special needs in the certain categories: learning disabilities - deaf - simple mental disabilities.

	N			Mean Rank			Sum of Ranks			Z			. Sig
	L	D	M	L	D	M	L	D	M	L	D	M	
Negative Ranks	15 ^a	13 ^a	13 ^a	8.00	7.00	7.00	120.0	91.0	91.0				.001
Positive Ranks	0 ^b	0 ^b	0 ^b	.00	.00	.00	00	.00	.00	-3.41	-3.19	-3.18	
Ties	0 ^c	2 ^c	2 ^c										
Total	15	15	15										

The previous table shows that there are statistically significant differences between the average grades of the ranks in the test of attention levels of the total score and the experimental group in two of the pre- and post-measurements in favor of the post-test. Where the value of $Z = (3.413)$ for those with learning difficulties, and the value of $Z = (3.19)$, and the value of z for those with intellectual disabilities (3.18) , which means that there is a high degree of attention to

the members of the experimental group in the post-test measurement.

2. According to the Second Hypothesis:

there are statistically significant differences between the average scores of the experimental group on the electronic attention disorder scale in the pre- and post-measurements in favor of the post-measurement."

Table 2. Wilcoxon Z for values and their significance for the difference between the average ranks of the experimental group scores on the electronic attention deficit disorder scale and its dimensions for the post- and post-measurements for students with special needs in the categories (learning difficulties - deafness - simple mental disability) $N = 10$.

	N			Mean Rank			Sum of Ranks			Z			Asymp. Sig. (2-tailed)		
	L	D	M	L	D	M	L	D	M	L	D	M			
Negative Ranks	0 ^a	0 ^a	0 ^a	.00	.00	.00	.00	.00	.00						
Positive Ranks	9 ^b	8 ^b	5 ^b	5.00	4.50	3.00	45.00	36.00	15.00	-2.73 ^b	-2.58 ^b	-2.070 ^b	.005	.010	.038
Ties	1 ^c	2 ^c	5 ^c												
Total	10	10	10												
Negative Ranks	0 ^d	0 ^d	0 ^d	.00	.00	.00	.00	.00	.00						

	N			Mean Rank			Sum of Ranks			Z			Asymp. Sig. (2-tailed)		
	L	D	M	L	D	M	L	D	M	L	D	M			
Positive Ranks	10 ^e	10 ^e	9 ^e	5.50	5.50	5.00	55.00	55.00	45.00	-2.85 ^b	-2.85 ^b	-2.762 ^b	.004	.004	.006
Ties	0 ^f	0 ^f	1 ^f												
Total	10	10	10												
Negative Ranks	0 ^g	0 ^g	0 ^g	.00	.00	.00	.00	.00	.00						
Positive Ranks	10 ^h	10 ^h	10 ^h	5.50	5.50	5.50	55.00	55.00	55.00	-2.83 ^b	-2.83 ^b	-2.850 ^b	.005	.005	.004
Ties	0 ⁱ	0 ⁱ	0 ⁱ												
Total	10	10	10												
Negative Ranks	0 ^j	0 ^j	0 ^j	.00	.00	.00	.00	.00	.00						
Positive Ranks	10 ^k	10 ^k	10 ^k	5.50	5.50	5.50	55.00	55.00	55.00	-2.82 ^b	-2.82 ^b	-2.877 ^b	.005	.005	.004
Ties	0 ^l	0 ^l	0 ^l												
Total	10	10	10												
Negative Ranks	0 ^a	0 ^a	0 ^a	.00	.00	.00	.00	.00	.00	-3.16	-2.82	-2.81 ^b	.005	.005	
Positive Ranks	10 ^b	10 ^b	10 ^b	5.50	5.50	5.50	55.0	55.0	55.00						.005
Ties	0 ^c	0 ^c	0 ^c												
Total		10	10												

L(Learning Disability), d(deaf), m(mild intellectual disability)

Looking at the previous Table 2, it is clear that there is a statistically significant difference between the average ranks of the experimental group scores in favor of the post-measurement in the dimensions included in the attention disorder scale and its dimensions and in the total score,

which confirms the first hypothesis of the study hypotheses. This means that there is a high degree of attention to the members of the experimental group in the post-measurement.

3. According to the Second Hypothesis:

Table 3. Wilcoxon Z values and their significance for the difference between the average ranks of the experimental group scores on the electronic attention deficit disorder scale and its dimensions for the post- and follow-up measurements for students with special needs in the categories (learning difficulties - deafness - simple mental disability) N = 10.

	N			Mean Rank			Sum of Ranks			Z			Asymp. Sig. (2-tailed)		
	L	D	M	L	D	M	L	D	M	L	D	M			
Negative Ranks	0 ^a	0 ^a	0 ^a	.00	.00	.00	.00	.00	.00	-2.871-	-2.829-	-2.829	.004	.005	.005
Positive Ranks	10 ^b	10 ^b	10 ^b	5.50	5.50	5.50	55.00	55.00	55.00						
Ties	0 ^c	0 ^c	0 ^c												
Total	10	10	10												
Negative Ranks	0 ^d	0 ^d	0 ^g	.00	.00	.00	.00	.00	.00						
Positive Ranks	10 ^e	9 ^e	10 ^h	5.50	5.00	5.00	55.00	45.00	55.00	-2.871-	2.739-	-2.739	.004	.006	.006

	N			Mean Rank			Sum of Ranks			Z			Asymp. Sig. (2-tailed)		
	L	D	M	L	D	M	L	D	M	L	D	M			
Ties	0 ^f	1 ^f	0 ⁱ												.00
Total	10	10	10												
Negative Ranks	0 ^g	0 ^g	9 ^e	.00	.00	.00	.00	.00	.00				-2.836-	-2.836	
Positive Ranks	10 ^h	10 ^h	1 ^f	5.50	5.50	5.50	55.00	55.00	45.00	-2.871-			.004	.005	.005
Ties	0 ⁱ	0 ⁱ	0												.00
Total	10		10												

Table 3 shows that there is no statistically (Z) significant difference between the average scores of the experimental group arranged for students with special needs in certain categories of learning disabilities - deaf - mental disabilities on a scale of attention and computational level in the post test and follow-up measurements. This indicates the verification of the third hypothesis.

9. Discussion

The study's findings showed that the computer game software was helpful in reducing attention deficit disorder in a sample of children with special needs, and this was supported by the students' considerable improvements in attention on the scale measures after using the program.

The findings of the follow-up measurement showed that this beneficial effect persisted after the program had concluded, demonstrating the program's feasibility in raising attention. The training program's reliance on nonverbal components boosted its effectiveness by taking into consideration the characteristics of kids with special needs.

The group training strategy utilized by the play attention6 program increased children's attention and resulted in a sense of fun while playing competitive games. Moreover, the activities used to improve attention skills, relied on fun and games. This is consistent with the results of earlier studies [26, 20, 21, 16, 15, 27, 4, 3, 10, 5, 25, 30].

The results of the study indicated the effectiveness of the computer games program, in reducing attention deficit disorder in a sample of children with simple mental disabilities. This is consistent with the results of studies of [15, 9, 7, 12, 27]. Additionally, the study found that, while computer games and the play attention6 program are just for pure entertainments, they also function as effective learning tools, which enables us to use them to develop new learning opportunities and tools. Computer games have been successfully used to treat attention deficit resulting in improved scanning and tracking. Video games have a great positive

potential in addition to their entertainment value and there has been a great success when games are designed to address a specific problem or to teach a certain skill. This is consistent with the results of studies of [26, 20].

10. Conclusion

The results of the study revealed that employing visual activities of the computer games (play attention6) program which is one of the cheapest technologies can reduce attention deficit disorder in children with special needs. On this basis, future research should employ computer evaluation program for identifying students with attention deficit in short time and by an objective method on a big sample, AND The program may be useful in treating mild attention problems in normal children who suffer from attention problems that cause poor academic achievement. Therefore, researchers recommend using the program in special education institutions.

Abbreviations

ADHD Attention Deficit Hyperactivity Disorder

Conflicts of Interest

The authors declare no conflicts of interest.

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