

## Research Paper

## The Efficacy of Therapeutic Use of Play on Improving Attention Span of Mild Intellectually Disabled Children



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## ABSTRACT

**Objectives:** This study aimed to determine the efficacy of the therapeutic use of play on improving the attention span of children with Mild Intellectual Disability (MID) in elementary school.

**Methods:** This was a quasi-experimental study with a pre-test-post-test with a control group so that 30 girls with MID were selected from an exceptional school in Tehran City, Iran, via convenience sampling method and assigned to the experimental and control groups. The attention span of all subjects was assessed by the Toulouse-Pieron test and the Cognitive Diagnostic Battery (CDB) before and after the therapeutic sessions. The experimental group participated in 16 therapeutic play sessions (35 minutes for each session) for 8 weeks, but the control group did not. The analysis of covariance (ANCOVA) was used to analyze the data.

**Results:** The Mean±SD age were 9.80±1.32 and 9.73±1.22 for the experimental and control groups, respectively. In addition, the mean attention span in the experimental group varied from 7.60 to 18.78 after the therapeutic sessions. In addition, after the therapeutic sessions, a significant difference ( $P < 0.001$ ) was observed between the experimental and control groups relating to attention span. According to the Eta quotient, 94% of the variation in the attention span of the experimental group is due to participating in the intervention sessions.

**Discussion:** Therapeutic use of play is an effective method to improve the attention span of children with MID. Therefore, the therapeutic use of play can be applied to improve the academic performance of students with MID and reduce negative outcomes due to inattention.

## Keywords:

Attention span, Children, Mild Intellectual Disability, Play

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## Highlights

- Intellectual disability is a neurodevelopmental disorder that is accompanied by deficiencies in both mental ability and adaptive functioning in three conceptual, social, and practical domains.
- Play is a therapeutic technique to treat a wide range of cognitive problems.
- Play therapy can assist children with mild intellectual disabilities to improve their attention span and prevent academic failure.

## Plain Language Summary

People with intellectual disability are slower in all areas of cognitive and social development and it is difficult to do daily life skills. Distraction and inattention are two important traits in students with intellectual disability. Attention is considered a cognitive process that helps people focus on a goal, retain the information, decode a new stimulus, and shift focus from one goal to another. The limitation of attention span is a basic factor for perceiving stimuli and affects the level of learning. The results of our study showed that when children with intellectual disability participate in play, they encourage the use of speech to communicate with peers, therefore their attention skills will promote and trigger positive emotions during play. In addition, they will be able to perform daily assignments in the correct way due to paying more attention to them and their academic failure will be reduced.

### 1. Introduction

**I**ntellectual Disability (ID) is one of the most common neurodevelopmental disorders affecting approximately 2-3% of children and its prevalence varies by age [1]. The majority of people with ID are classified as Mild Intellectual Disability (MID) and are slower in all areas of conceptual, social development, and daily living skills [2]. Intellectual disability is characterized by a significant limitation in mental performance and adaptive behavior and it starts before the age of 18 years [3]. Children with MID may not be identifiable until school age. It occurs in about 0.5%-1.5% of the population depending on the definition used and the demographic and socioeconomic factors of the studied area. It also affects abstract/theoretical thinking as well as other cognitive functions, leading to deficits in other areas. The slow rate of learning and delay in most areas of development are the two indicators of MID. Concurrent cognitive difficulties related to concentration and motor control are common among individuals with MID [4].

Some researchers [5] also introduce distraction and inattention (limited attention span) as two important traits for students with MID. These two main indicators provide a good platform for the occurrence of disorders in a person's adaptive behavior. Attention is defined as a set of cognitive processes that include focusing on a goal, maintaining information, decoding the character-

istics of a stimulus, staying vigilant for a long time, as well as shifting focus from one goal to another [6]. Six components of attention include regulation, selective attention, sustained attention, attention span, inhibition, and behavior control [7]. In particular, the imitated attention span is the main factor for perceiving stimuli that strongly affects the level of learning and perception [8]. Lack of attention on homework leads to failure and negative feedback in various areas of the environment in which a child lives [9] and may experience negative communication while feeling helpless during compensating for the situation [10].

These deficiencies hinder the children from learning and developing normally [11]. These limitations are considered difficulties in cognitive processes, such as memory, reasoning, language, planning, decision-making, and attention [12]. The cognition theories state that cognitive processes are deeply rooted in the body's interactions with the surrounding [13]. From Piaget's view, children's play has a vital role in the intelligence growth of children. Piaget stated that human intelligence and personality grow through playing a game. A child can improve cognitive processes (attention, perception, memory, and concentration) during playing the game [14]. Researchers confirm that when typically developing children are playing the game, they use language to communicate with each other. They also improve their language skills by developing vocabulary and learning their usage, meaning, and grammar

[15]. To find the most influential techniques, studies have examined the efficacy of different methods. The therapeutic use of play is a beneficial method to treat a wide range of cognitive and behavioral problems [16]. Playing is an active process that a therapist interacts with children, therefore they can explore the surrounding that influences their current life [17-19].

It is essential to consider the merits of the property of play along with the use of unique opportunities for play for intellectually disabled children to expand cognitive functions and control behaviors. Axline [20] considered many guiding principles for the counselor in Child-Centered Play Therapy (CCPT). These principles emphasize the primacy of the counseling relationship, including the counselor a) creates a kind and warm atmosphere with a child; b) unconditionally accepts the child; c) allows the child to express herself freely, d) understands the child feeling and reflects them; e) relies on the child's ability to solve the problems; f) takes responsibility for the child's involvement but does not directly guide the child; g) considers the gradual of the child's process and does not attempt to rush counseling; h) recognizes that some limitations are needed.

Literature review shows that playing games promote the cognitive abilities of children with developmental disabilities [17]. Comprehensive meta-analyses declared that play is an effective intervention for children [16, 21, 22]. Most studies have used CCPT, especially with children identified as internalizing behaviors [23, 24].

Therefore, it can conclude that by enhancing the attention span of individuals with MID, their ability to perform daily activities will increase. Some studies have used the CCPT to reduce behavioral [25, 26], emotional [27-29], social [30, 31], and cognitive problems [32] but only a few studies have examined the impact of the therapeutic use of play on the attention span of children with Attention-Deficit/Hyperactivity Disorder (ADHD) [23] and cognitive domains of children with MID [12]. The present research seeks to explore how the CCPT can assist children with MID improve their attention span. The purpose of the present study was to determine the effect of the therapeutic use of play on the attention span of children with MID.

## 2. Materials and Methods

The research was a quasi-experimental study with a pretest-posttest control group design. The statistical population included all 8-12-year-old female students with MID enrolled in exceptional elementary schools

in Tehran City, Iran, from 2017-2018. The study sample included 76 female students selected from two exceptional schools in the fifth educational district in Tehran City using the convenience sampling method. The inclusion criteria included obtaining an intelligence quotient (IQ) of 60-69 according to their educational file, not having disabilities, such as Attention-Deficit/Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), or visual/hearing impairments, simultaneously participating in the intervention similar to play of the game. Based on the sample size formula, with a test power of 0.80, test error of 0.05-, and considering the possible loss of 20%, 15 children (30 individuals in total) were selected and randomly assigned to the experimental and control groups. One school was considered an experimental group and the other school was a control group. All participants were recruited from exceptional schools (studying in the first to the third grades). Sixteen samples (53.3%) were studied in the first grade, twelve samples (40%) in the second grade, and two samples (6.7%) in the third grade. The experimental and control group matched according to age, academic level, and intelligence quotient based on their educational file. Three tools were used to collect the data:

### Demographic questionnaire (DQ)

The Demographic questionnaire (DQ) is a brief demographic questionnaire used to collect information, such as grade, age, birth order, level of intellectual disability, parents' occupation, and parent's educational level. It consisted of close-ended questions and was completed by the student's parents.

### Toulouse-pieron test (TPT)

Henri Pieron creates the Toulouse-Pieron test (TPT) to evaluate the capacity of concentration on monotonous tasks. The participants were expected to identify examples of two target figures within a large set of similar and different figures. A total of 1,600 figures exist within 400 targets. These figures are arranged in 40 rows. Each row consists of 40 figures that 10 target figures located in each row. The TPT is also known as "Spiky Squares" and its validity and reliability were reported by previous studies [33, 34]. The participants have five minutes to start from the left to the right of the test page, select, and mark all the squares that are similar to the sample square. One positive score considers for each correct choice and receives a negative score of 0.5 for each incorrect or forgotten choice. The individual's attention score is calculated via their algebraic sum. Rezaian and her colleagues have modified and edited the TPT based

on the characteristics of Iranian students with MID and it is used in the present study. The correlation coefficient of the scores obtained from the premeasurement of the TPT was 0.91. Therefore, the scores of the two tests had a high correlation, which indicates the appropriate reliability of the instrument [35].

### Cognitive diagnostic battery (CDB)

The Cognitive Diagnostic Battery (CDB) was developed to meet the need for cognitive evaluation of psychiatric patients and patients with ID. The five tests that make up this battery assess areas such as conceptual style, social thinking development, perceptual motor growth, attention span, and psychomotor speed [36]. These tests are designed to measure the cognitive effects relating to the growth and cognitive effects due to arousal separately. Because of the purpose of our research, we only describe the attention span test in the current study. The attention span test targets an evaluation method, in particular the aspect of attention deficit that relates to the conscious persistence of concentration. The attention span test along with the temporal attention test also provides the possibility of measuring psychomotor speed. The test assesses attention span based on the average duration of the subject's attention span on a motor task. It consists of a page containing 500 X symbols separated by a dash. The test is performed individually and the time is recorded at the same time as the beginning of the task and without the knowledge of the subject [36]. The maximum time for the test of attention span is 400 seconds, and the subject receives a maximum score of 400. A person's marking time is their attention span score, which can be up to 400 seconds. The reliability of the attention span test was reported as 0.82 by the retest

method. The correlation between the results of the attention span test and methods such as tonic pulse rate, insomnia, and resistance to chloral hydrated has been reported to be 0.39, 0.35, and 0.48, respectively [37].

To evaluate the efficacy of the CDB, it was performed on 30 normal adults, 30 schizophrenics, and 30 intellectually disabled children. The results showed high validity of the test in the normal adult group. In addition, the CDB can differentiate the studied groups and are an effective tool for early screening of ID in the Iranian population [38]. The retest reliability of the CDB was reported at 0.86 in 4-week intervals [39].

### Research Procedure

At first, an official introduction letter was received from the University of Social Welfare and Rehabilitation Sciences (USWR) as well as permission from the exceptional education organization in Tehran City. Then, the researcher considered the fifth educational district as a target population. Due to the small size of students educated in each exceptional school in the district in addition to considering inclusion criteria, two exceptional elementary schools were randomly selected which had 76 eligible students with MID. Among them, 15 female students were randomly selected from each school based on the inclusion criteria, and all subjects were matched according to their demographical factors. Then, one school was randomly considered as an experimental group and the other as a control group. All subjects' parents signed the written informed consent and completed the DQ. The attention span of participants was assessed by TPT and CDB. It was not a blind assignment, but the

**Table 1.** Content of CCPT sessions

Sessions	Objectives	Activities
1	Briefing, familiarity with session goals, unconditioned acceptance	Greetings, familiarity with the CCPT, encouraging children for communicating with the therapist, unconditioned acceptance of children by the therapist
2, 6, 10	Increasing concentration	Playing clock and blow game to increase visual accuracy and concentration in a limited time, selecting a reward by a child in case of success
3, 7, 11, 14	Increasing attention, motor coordination	Playing hopscotch to increase attention and concentration, gross motor coordination
4, 8, 12, 15	Increasing accuracy for decision-making	Playing tic-tac-toe to increase concentration, attention, and accuracy in decision-making against the competitor
5	Improving visual and auditory differentiation	Playing figure and color games to improve visual and auditory concentration
9	Improving visual discrimination	Play seeing and guessing games to promote visual discrimination and concentration
16	Expressing feeling	Preparing children to end the treatment and accept it, drawing a picture and coloring it to express their feelings

CCPT: Child-centered play therapy.

evaluation was administered by the researcher and the scoring was done by her assistant. The experimental group received 16 sessions (35 minutes per session) of the therapeutic use of play. The content of the sessions was designed according to child-centered play therapy and is listed in Table 1. Due to the formation of an emotional relationship between the child and the therapists, in addition to prevent its sudden cessation, the intervention sessions were held 3 times a week in the first three weeks, twice a week in the fourth to sixth week, and once a week in the last week (the seventh week). Considering that children with MID need to repeat things to learn them, the content of the second, third, and fourth sessions is repeated. Although, the control group received the mainstream program of the school and had no intervention similar to the experimental group. To observe ethical considerations, the control group received intervention content in two comprehensive sessions after the study. After the last session, the attention span of all participants was assessed by the TPT and the CDB.

After reviewing child-centered play therapy studies on children (especially with neurodevelopmental disorders), the therapeutic use of play was prepared according to Axline [20], Rathnakumar [40], and Bhat-tacharya [41]. The content was validated according to the views of the qualified experts (research team) and the final protocol was prepared.

The therapeutic sessions were implemented by a clinical psychologist who was an expert in art therapy and a MSc student in psychology and exceptional education who completed the courses in play therapy and attends direct supervision with a psychologist certified in play therapy. The therapeutic sessions were conducted in playrooms equipped with different and specific toys to facilitate expression [19]. The protocol was designed in a way to provide verbal and nonverbal responses of the therapist to the child during the sessions. The verbal skills involve responses structured into categories that help facilitate growth in the child. They include tracking behavior, reflecting content, reflecting feeling, facilitating decision-making/returning responsibility, facilitating creativity/spontaneity, esteem building/encouraging, facilitating relationship, and limit-setting [40, 42]. The sample of nonverbal responses of the therapist was always biased toward the child. The therapist matched her tone according to the level of affect displayed by the child while responding to the child.

The SPSS software v. 22 was used to analyze the collected and coded data derived from the TPT and the CDB results. The mean and standard deviation are measured as descriptive statistics. To compare the experimental and control group relating to attention span, analysis of covariance (ANCOVA) was used. The significant level is considered 0.05 in the present study.

### 3. Results

The Mean±SD age of the experimental and control group was  $9.80\pm 1.32$  and  $9.73\pm 1.22$ , respectively. The result of the t test showed that the experimental and control groups are not different in terms of their age (0.887). In addition, Fisher's exact test showed no significant difference between the experimental and control groups in terms of academic grade (0.998), birth order (0.387), father and mother's occupation (0.536), father's educational level (0.881), and mother's educational level (0.589) (Table 2).

The Mean±SD and standard deviation of attention span obtained from the TPT before the therapeutic sessions in two groups were  $7.60\pm 4.72$  and  $6.1\pm 6.85$ , respectively, which changed to  $18.78\pm 4.84$  and  $6.50\pm 3.86$  after the intervention, respectively. Furthermore, the Mean±SD and standard deviation of attention span obtained from the CDB before the therapeutic sessions in the experimental and control groups were  $218.6\pm 104.34$  and  $262.5\pm 74.4$ , respectively, and changed to  $265.6\pm 90.14$  and  $265.7\pm 73.34$  after the last sessions, respectively. No significant difference was observed between the attention span of the two groups before the therapeutic sessions based on the scores obtained from the TPT and the CDB (Table 3).

For the normality of the distribution of variables, the Kolmogorov-Smirnov test was used. According to the obtained P values, which ranged from 0.366 to 0.988, we can conclude that the distribution of all variables is normal. The results of ANCOVA showed that the mean attention span of the two groups obtained from the TPT differed significantly after the intervention sessions (0.001). According to the eta quotient, we can conclude that 94% of the variation in the attention span of the experimental group is due to participation in the therapeutic sessions. In addition, the results of ANCOVA indicated a significant difference between the attention span of the two groups obtained from the CDB after the intervention ( $P=0.002$ ). Furthermore, according to the eta quotient, we can explain that 29% of the variation in the attention span of the experimental group is due to attend in play therapeutic sessions. Table 4 presents the results of ANCOVA.

**Table 2.** Comparing the demographic characteristics of two groups

Variables	Experimental	Control	Fisher Statistics	P	
Academic grade	First-introductory	4	5	1.37	0.998
	First-supplementary	4	3		
	Second-introductory	3	4		
	Second-supplementary	3	2		
	Third-introductory	1	1		
	Total	15	15		
Birth order	First	4	3	3.02	0.387
	Second	3	7		
	Third	5	2		
	Fourth	3	3		
	Total	15	15		
	Father's occupation	Unemployed	3		
Self-employment		10	11		
Clerk		2	3		
Total		15	15		
Mother's occupation	Housewife	15	14	1.24	0.536
	Employed	0	1		
	Total	15	15		
Father's educational level	Illiterate	4	5	0.254	0.881
	Below seventh grade	7	7		
	Seventh grade and higher	4	3		
	Total	15	15		
Mother's educational level	Illiterate	6	6	0.105	0.589
	Below seventh grade	8	9		
	Seventh grade and higher	1	0		
	Total	15	15		



**Table 3.** Mean±SD of attention span in two groups based on the TPT and CDB

Tests	Groups	Mean±SD	
		Pre-test	Post-test
TPT	Experimental	7.60±4.72	18.78±4.84
	Control	6.1±6.85	6.50±3.86
CDB	Experimental	218.6±104.34	265.6±90.14
	Control	262.5±74.4	265.7±73.34

CDB: cognitive diagnostic battery; TPT: Toulouse-Pieron test.

Iranian Rehabilitation Journal

**Table 4.** Results of ANCOVA for comparing attention span in two groups based on the TPT and CDB

Test	Source of Change	SS	df	MS	F	P	$\eta^2$
TPT	Pretest	492.02	1	492.02	288.24	< 0.001	0.91
	Group	859.86	1	859.86	503.74	< 0.001	0.94
	Error	46.08	27	1.70			
CDB	Pretest	165929.89	1	165929.89	193.42	0.001	0.87
	Group	9729.12	1	9729.12	11.34	0.002	0.29
	Error	23162.64	27	857.87			

Iranian Rehabilitation Journal

CDB: Cognitive diagnostic battery; TPT: Toulouse-Pieron test; SS: Sum of squares; MS: Mean sum of squares.

#### 4. Discussion

This study aimed to investigate the efficacy of therapeutic use of play on the attention span in 8-12-year-old girls with MID. The findings showed that play leads to the improvement of attention span in girls with MID. Many previous studies to promote the behavioral [7] [24], emotional [28, 29], social [30, 31, 43, 44], and cognitive [17, 45] abilities are consistent with this finding and confirm that child-centered play therapy can help increase the cognitive areas of the typically developing children, especially children with neurodevelopmental disorders. The meta-analysis of some studies [16, 21] indicated that despite the intervention type and methodologies proposed so far, the therapeutic use of play that was conducted in the present study is an effective method for the improvement of children. The results of the [46] study are consistent with present findings which showed that play can promote concentration and maintain attention [47]. Therefore, the collaboration of the children with the therapist and activation with a wide range of toys and other materials stimulates the attention of children with MID [48]. Moreover, the use of diverse games

along with a child-centered approach stimulates children with MID to expand cognitive functions [16] and the opportunities created in the game to maintain focus on the game without distraction [49]. Schweitzer [50] declared that unlike normal developing children, children with ID are not curious and have limited motivation, therefore they cannot focus on their assignments and be successful in accomplishing homework. Play as a therapeutic method helps children not only express their problems but also solve them in a secure communication setting. Therefore, children with ID can focus on the goal in a safe environment away from the fear of punishment or judgment, and achieve success by repeating the activity. As a result, they can recreate and experience a new situation to turn many abstract activities into concrete so that they can better understand them [46].

The current finding was inconsistent with the finding of one study [51] stated that play as a therapeutic method does not reduce attention problems in emotionally and physically abused children. One of the negative consequences of child abuse is the underdevelopment of the frontal cortex and poor coordination of the cerebral hemispheres, which leads to problems in regulat-

ing attention, emotions, and functional coordination for abused children. The low level of function of the frontal cortex in attention problems is one of the reasons for the inefficiency of play therapy on their attention problems.

Finally, during play sessions, the child can achieve a sense of adequacy and success by repeating and mastering the activity used in the game. Since a low level of self-esteem and negative self-concept is one of the mediating factors in the formation and exacerbation of attention problems in children with MID, the experience of participating in play sessions helps the child to increase her self-concept and activities and pay more attention to the games [52]. Therefore, if teachers set the school curriculum based on science and principles and emphasize planning more on games that develop children's cognitive domain in attention factor, many of the attention problems of children with MID would be reduced and their energy would be saved to focus on learning goals [35]. Lack of providing a long-term play session, small sample size, considering two schools separately as an experimental and a control group, and lack of follow-up are the main limitations of the present study. It suggests that forthcoming studies should be conducted with larger sample sizes among male children, in addition to more therapeutic sessions, and a follow-up.

## 5. Conclusion

It needs to develop a long-term intervention study to have benefits for more cognitive processes rather than attention span and populations, especially with memory difficulties. The short-term play therapy applied in the present study proved to be effective in improving the attention span of children with MID. The findings suggested that children who are given more opportunities to repeat their games may show greater levels of attention and participation. Therefore, the current findings endorse the importance of play opportunities in improving attention span in children with MID. Further research is needed to generalize and clarify the efficacy of therapeutic use of play on attention span, professionals who provide school-based psychoeducation interventions may use play with children who show maladaptive behaviors in the classroom due to inattention difficulties.

## Ethical Considerations

### Compliance with ethical guidelines

The study was approved by the [University of Social Welfare and Rehabilitation Sciences \(USWR\)](#) and all mothers of children signed the informed and a written consent was obtained for being included in the study.

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## Authors' contributions

All authors equally contributed to the preparation of this article.

## Conflict of interest

The authors declared no conflict of interest.

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