

# Investigation of the Effect of 12-Week Kinesthetic Intelligence Training Program on the Aggression Levels of Students with Intellectual Disabilities

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## Abstract

This study aims to examine the effects of Mind Sports (chess and mancala) and Bodily-Kinesthetic Intelligence Training on the aggression levels of students with mild intellectual disabilities. The sample of the study consisted of a total of 60 students with mild intellectual disabilities (30 in the experimental group and 30 in the control group) who study at schools affiliated with the Gaziantep Provincial Directorate of National Education. While Buss-Perry Aggression Questionnaire (1992) was applied as a pre-test and post-test to both groups, three hours of Mind Sports and Bodily-Kinesthetic Intelligence training was given to the experimental group three days a week for twelve weeks. (Monday, Tuesday and Wednesday 1,5 saat Mind Sports and 1,5 saat Bodily-Kinesthetic Intelligence training) The data obtained were analyzed by conducting frequency and percentage analyses, while dependent and independent t-tests were conducted to analyze the pre-test and post-test data using the statistical software of SPSS 24.0. According to the pre-test scores, a significant result could not be found between the experimental and control groups ( $p > .05$ ). According to the evaluation between the experimental group and the control group, a significant result was found in the post-test scores in favor of the experimental group ( $p > .05$ ). Based on the data obtained, we can conclude that Mind Sports and Kinesthetic Intelligence Training positively reduce the aggression levels of children with mild intellectual disabilities.

**Keywords:** kinesthetic intelligence, mind sports, individuals with mild intellectual disability, aggression

## 1. Introduction

Intelligence is an important factor in the fulfillment of mental functions. It is the ability to solve problems, draw learning inferences from everyday experiences by adapting to them, and create new connections and associations (Santrock, 2014; p. 294; Yüksel, 2008, p. 9). Mind Games help children and adults improve their strategy development, planning, reasoning, logical integration, visual-spatial thinking, thinking outside the box, attention, concentration, and memory (Gençay et al., 2019). Intelligence is the ability to learn and find new solutions as a result of the combination of our physical abilities, social abilities, and functions (Üçüncü & Kütükçü, 2016, p. 155).

According to the results of appropriate standardized intelligence tests, people with mild intellectual disabilities are those with intelligence scores between 50 and 69. Many individuals with mild intellectual disabilities have characteristics very similar to individuals with normal development, and they cannot be separated from the general population because their intellectual disabilities are very mild. However, they usually learn more slowly at school (Ersoy & Avcı, 2001, p. 147; Üçüncü & Kütükçü, 2016, p. 160). Moreover, their social skills, communication skills, and functional academic skills (literacy, arithmetic) are retarded (Yüksel, 2008, p. 23).

Due to their deficiencies in intellectual functioning and conceptual, social, and practical adaptive skills, individuals with mild intellectual disabilities are in need of training support services and special training (Sucuoğlu, 2013). Students with intellectual disabilities are unable to meet the expectations of society in terms of their physical and mental functions. Therefore, they have difficulty adapting to the environment they live in (Atalay Güzel & Kafa, 2016, p. 160). Physical education, which is a part of education, ensures the mental and physical development of the students and enables them to enjoy sports activities (Gençay et al., 2019). According to Gardner (2004), in exceptional individuals, such as autistic children, the domain of bodily intelligence is

preserved, whereas the domain of intelligence is damaged. Trainers may notice that some of their students with disabilities like physical activities (Beam, 2009). Gardner (2009) states that individuals may have strong spatial intelligence while their interpersonal intelligence and bodily-kinesthetic intelligence are mediocre.

Kinesthetic Intelligence refers to actions performed physically (Checkley, 1997). Kinesthetic intelligence requires coordination, speed, dexterity, and balance. These students are good at reading body language or communicating with body language (Wilson, 1994). They express their feelings and thoughts mostly using body language. In learning activities, they remember what is performed rather than what is said (McKenzie, 2005). Activities such as cutting and pasting, animation, and charades to develop physical-kinesthetic intelligence are included in the learning activities. In addition, several activities such as dance shows, teaching sign language, making drama, thinking based on dexterity, teaching fine motor skills, solving puzzles, and preparing puppet shows can be used (Yavuz, 2005; Baum, Viens & Slatin, 2005; Saban, 2005; Bümen, 2005; Karadağ, 2009).

Mancala can be defined as a game based on cognitive power and played on a game platform. It is observed that mental performance is high during the stone distribution stage in the mancala game. It can also be stated that the mancala game acts as a carrier of culture. Considering the rules of the mancala game, it is observed that basic rhythmic counting skills are intense in the game. In addition to these skills, the mancala game is considered to improve the skills of strategic thinking, attention, memorization, arithmetic thinking, obeying rules, and being respectful. The values and skills that the mancala game, which is one of the games taught in the Mind Games curriculum by the Ministry of National Education, adds to students are cunning, alertness, foresight, flexibility, resistance, farsightedness, and memory (Aslan, 2019). Considering the relationship of the mancala game with other disciplines, it is observed that it has the closest relationship with the mathematics course (Umay, 2007).

Chess is another mind game that affects mental processes (Şahin, 2022). Thanks to chess, individuals can improve their ability to focus, use time efficiently, and plan ahead. In chess, where mental processes are frequently used, the problem-solving skills of individuals are improved (Erhan et al., 2008). Burgoyne et al. (2016) conducted a meta-analysis to evaluate the correlation between cognitive ability and chess skills. According to the results obtained from the research, chess skill was found to have a significant positive correlation with four broad cognitive abilities (fluid reasoning, comprehension-knowledge, short-term memory, and processing speed). The results of a study conducted by Tekneci (2009) revealed that the mathematic skills of children who received chess training were positively affected, and their scores were high.

Individuals with intellectual disabilities have higher levels of aggression and anger that are difficult to cope with. Individuals are observed to have tantrums and become aggressive, particularly because they are not able to express themselves conveniently. However, the studies have not adequately addressed these issues (Şipal, 2010). It is aimed to reduce aggressive behaviors of children with mild intellectual disabilities, who are prone to these behaviors, and to make them feel calmer, happier, and more self-confident through mind sports (chess and mancala) and kinesthetic intelligence.

## **2. Method**

### *2.1 Study Group*

A total of 60 students with mild intellectual disabilities, who continue their education in schools affiliated with the Gaziantep Provincial Directorate of National Education, participated in the study. Of the study group, 14 were males, and 16 were females. Two groups of 30 participants were formed as the experimental group and control group. The age ranges of the experimental group and control group vary between 12-14.

### *2.2 Procedure*

A personal information form was filled out, and the aggression questionnaire was applied as a pre-test for both the experimental group and the control group. Then, three hours of Mind Sports (chess and mancala) and Bodily-Kinesthetic Intelligence Training were given to the experimental group three days a week for a total of twelve weeks. No training was given to the control group. After 12 weeks, the aggression questionnaire was applied to both groups again, and the result was obtained.

### *2.3 Data Collection Tools*

“Personal information form” and the “Buss-Perry Aggression Questionnaire (BPAQ)” were used as data collection tools to determine the demographic details of the students and their aggression levels, respectively.

### *2.4 Personal Information Form*

A personal information form consisting of a total of 3 questions, in which the age, gender, and classes of the students were asked, was prepared and applied.

### 2.5 Buss-Perry Aggression Questionnaire

The questionnaire developed by Buss-Perry (1992) consists of 4 sub-dimensions and 29 items in total. The questionnaire, which was updated by Buss and Warren (2000) later, included a total of 34 items and five sub-dimensions. According to the literature review, it is observed that the previous form of the questionnaire, which includes 29 items and four sub-dimensions, is used more widely in the studies. The questionnaire was adapted to Turkish by Madran (2013) after conducting its validity and reliability study. The questionnaire consists of 5-point Likert-type items that can be responded to by “extremely uncharacteristic (1), somewhat uncharacteristic (2), neither uncharacteristic nor characteristic (3), somewhat characteristic (4), extremely characteristic (5)”. Two items in the questionnaire (items 9 and 16) are reversely coded. While items 13, 8, 2, 11, 25, 16, 29, 22, and 23 measure the physical aggression sub-dimension of the BPAQ, items 27, 6, 21, 14, and 4 measure the verbal aggression sub-dimension, items 20, 24, 3, 26, 10, 15, 7, and 17 measure the hostility sub-dimension, and items 19, 28, 1, 18, 9, 23, 12 measure the anger sub-dimension. The aggression levels are evaluated according to the scores obtained from the questionnaire. While a score of 58 and below indicates a low level of aggression, a score between 59-110 indicates a moderate level of aggression, and a score of 111 and above indicates a high level of aggression.

### 2.6 Data Analysis

SPSS 24.0 statistical software was used to analyze the data obtained from the research. Descriptive statistics such as percentage (%), frequency, mean value, and standard deviation were calculated. Student's t-test was used in the comparison of pre-test and post-test results.

## 3. Results

Table 1. Testing the normal distribution of BPAQ scores of students with mild intellectual disabilities

	Sub-dimension	Skewness	Kurtosis
Control Group	Physical Aggression	.490	.412
	Verbal Aggression	-.143	-.029
	Hostility	-.462	-.251
	Anger	-.301	-.875
Experimental Group	Physical Aggression	.098	-.1070
	Verbal Aggression	-.118	-.873
	Hostility	-.559	.1368
	Anger	-.370	-.093

Table 1 reveals that the physical aggression scores of the control group have a skewness value of .490 and a kurtosis value of .412, the verbal aggression scores of the control group have a skewness value of -.143 and a kurtosis value of -.029, the hostility scores of the control group have a skewness value of -.462 and a kurtosis value of -.251, the anger scores of the control group have a skewness value of -.301 and a kurtosis value of -.875. The physical aggression scores of the experimental group were found to have a skewness value of .098 and a kurtosis value of -.1070, and the verbal aggression scores of the experimental group were found to have a skewness value of -.118 and a kurtosis value of -.873, the hostility scores of the experimental group were found to have a skewness value of -.559 and a kurtosis value of .1368, the anger scores of the control group were found to have a skewness value of -.370 and a kurtosis value of -.093. Skewness and kurtosis values between -2 and +2 indicate that it is suitable for normal distribution (George & Mallery, 2010).

Table 2. Distribution of personal information of students with mild intellectual disabilities

Variable	Sub-Dimension	Experimental Group		Control Group	
		<i>f</i>	%	<i>f</i>	%
Gender	Male	14	46.7	14	46.7
	Female	16	53.3	16	53.3
Age	12	5	16.7	5	16.7
	13	14	46.7	14	46.7
	14	11	36.7	11	36.7
Grade	6	4	13.3	4	13.3
	7	13	43.3	13	43.3
	8	13	43.3	13	43.3

Table 2 reveals that the majority of the students participating in the study are female (53.3%), the percentage of the age group of 13 years was higher than the other groups (46.7%), and the number of 6th graders (13.3%) is low compared to others.

Table 3. Pre-test and post-test paired-samples t-test results of the aggression questionnaire subs-dimensions of students with mild intellectual disabilities

Sub-Dimensions	<i>Pre-Test</i>		<i>Post-Test</i>		<i>t</i>	<i>p</i>
	<i>x</i>	<i>SD</i>	<i>x</i>	<i>SD</i>		
Physical Aggression	30.80	2.72	30.90	2.31	-.145	.886
Verbal Aggression	12.03	2.72	11.57	2.55	.736	.467
Hostility	22.53	4.58	23.00	2.95	-.694	.493
Anger	23.03	2.47	23.10	2.04	-.129	.899

According to Table 3, the pre-test and post-test mean scores of the sub-dimensions of the aggression questionnaire are close to each other for the control group; therefore, no significant result has been found ( $p > .05$ ).

Table 4. Paired-samples t-test results of the aggression questionnaire pre-test and post-test of students with mild intellectual disabilities

Sub-Dimensions	<i>Pre-Test</i>		<i>Post-Test</i>		<i>t</i>	<i>p</i>
	<i>x</i>	<i>SD</i>	<i>x</i>	<i>SD</i>		
Physical Aggression	31.06	2.92	21.20	3.25	11.333	.000
Verbal Aggression	12.03	2.72	13.13	2.66	-1.403	.171
Hostility	22.53	4.58	18.53	3.22	3.662	.001
Anger	23.36	2.93	17.03	2.07	9.403	.000

Table 4 reveals that there is a significant difference between the pre-test and post-test results of the experimental group of students with mild intellectual disabilities in terms of the following sub-dimensions of the aggression questionnaire: physical aggression ( $t=11.333$ ,  $p < .05$ ), hostility ( $t=3.662$ ,  $p < .05$ ), and anger ( $t=9.403$ ,  $p < .05$ ). It is seen that the pre-test scores are higher and there is a significant decline in the post-test scores. The sub-dimension of verbal aggression ( $t=-1.403$ ,  $p > .05$ ) showed no significant difference. It was concluded that mind sports and kinesthetic intelligence training significantly reduced aggression in individuals with mild intellectual disabilities.

Table 5. Paired-samples t-test results of the aggression questionnaire total pre-test and post-test scores of the control group and experimental group of students with mild intellectual disabilities

Variable	Pre-Test <i>x</i>	SD	Post-Test <i>x</i>	SD	<i>t</i>	<i>p</i>
Control Group	86.37	7.57	87.67	5.35	-.956	.347
Experimental Group	86.96	7.88	70.53	7.73	7.101	.000

According to Table 5, the pre-test and post-test scores of the control group are close to each other in terms of the total scores of the aggression questionnaire ( $t=-.956$ ,  $p>.05$ ). On the other hand, there is a significant decline in the mean scores of the students in the experimental group ( $t=7.101$ ,  $p>.05$ ). It was concluded that mind sports and kinesthetic intelligence training significantly reduced the aggression levels of the students in the experimental group.

#### 4. Discussion and Conclusion

According to the results of the correlation analysis conducted to determine the relationship between aggression and the mind and logic games in the study conducted by Çankaya and Ergin, there is a significant negative correlation between the scores at the level of 9.4% ( $r=-0.094$ ;  $p=0.024<0.05$ ). Accordingly, they concluded that the aggression score decreases as the frequency of playing mind and logic games increases (Çankaya & Ergin, 2015, pp. 283-297).

Aslan's (2017) study comparing the pre-test and post-test anger status of individuals with intellectual disability in the exercise and sportive game program reports that doing sports minimizes the occurrence of anger in children with intellectual disabilities and that it helps to control the state of anger; however, it emphasizes that the anger levels have not changed. In a study conducted by Sonuç (2012) on educable children with intellectual disabilities in the 10-19 age group, it was found that there was a decrease in the anger levels of children with intellectual disabilities who are engaged in sports.

In a study conducted on students with intellectual disability, a significant positive difference was found in the socialization levels of the students with intellectual disability who underwent a special physical education program (İlhan, 2008).

The study conducted by Aslan (2019) concluded that the mancala game mostly contributed to the mental and social development of the students. The study conducted by Türkoğlu (2016) concluded that it affected their social development and cognitive development skills such as number concept, language concept, discrimination speed, place concept, etc., as well as their mental development. In a study examining the effect of mind games on the problem-solving skills of fourth graders, Şahin (2019) found that playing mind games improved the problem-solving skills of students. Another study conducted by Demirel (2015) concluded that Mind Games, including the mancala game, contributed to the academic performance of students in both Mathematics and Turkish courses. These results may be attributed to constantly making calculations and rhythmic counting while playing the mancala game. Since there is constant communication while playing the mancala game, people having no social relationships before can develop friendships while playing mangala.

On the other hand, Aydın (2015) argues that chess has multifaceted academic effects, such as the development of mental skills, analytical thinking, and problem-solving. Çubukçu and Kahraman (2018) examined the effect of chess training on the problem-solving skills of children who had and did not have chess training during the preschool period, and their study concluded that the problem-solving skills of children who learned or played chess in the preschool period were positively affected compared to others. According to the results of the study conducted by Sığirtmaç (2016), the creative thinking and mind test scores of children who received chess training were found to be higher.

Yangués et al. (2020) conducted a study with a design to rehabilitate individuals diagnosed with hyperactivity disorder through an augmented reality chess video game; Rodrigo-Yangués et al. (2021) improved this study and applied it to individuals diagnosed with hyperactivity disorder, and the results of the study suggested that virtual chess games may help individuals with hyperactivity disorder to overcome their disorder. In a study conducted on individuals in the preschool period, Akar (2021) concluded that chess training has positive effects on the development of attention.

Considering the effect of mind sports (chess and mancala) and bodily-kinesthetic intelligence training on the aggression levels of students with mild intellectual disabilities, it was concluded that it declined the aggression from high to medium levels in children with mild intellectual disabilities who received mind sports and

bodily-kinesthetic intelligence training.

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**Competing interests**

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**Data sharing statement**

No additional data are available.

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