

## Investigation of the Effects of Brain Teasers on Attention Spans of Pre-School Children

Meryem ALTUN<sup>a</sup>, Muhsin HAZAR<sup>a</sup>, Zekihan HAZAR<sup>a</sup>

<sup>a</sup>Gazi University, Faculty of Sports Science, TURKEY

### ABSTRACT

The purpose of this study is to investigate the effects of brain teasers on attention spans of pre-school children of age six. The study was conducted using an experimental design with a control group and pre-test/post-test. The sample of the study is children of age six selected via random appointment among ones who were enrolled in the Merkez Kindergarten in the province of Sivas, district of Şarkışla in the school year 2014-2015. The sample consists of a total of 213 participants including 113 in the experiment group and 100 in the control group. "Frankfurter Tests für Fünfhellige-Konzentration" was used as the measurement tool. The experiment group was given the brain teaser curriculum 3 days a week, one hour a day for 10 weeks, while the control group was given only the National Education Ministry Pre-School curriculum. The obtained data were organized and analyzed using the SPSS 22 (Statistical Package for the Social Sciences) package software. Dependent samples t-test was used in order to analyze the differences between the experiment and control groups, while percentages, frequencies and means were used for demographics. As a result of the study, it was seen that there was a significant difference in favor of the experiment group between the attention spans of children who received the brain teasers curriculum and children who received the National Education Ministry Pre-School curriculum. This result shows that brain teasers are effective in improving the attention span.

### KEYWORDS

Attention, Pre-School, Brain Teasers

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### Introduction

The debates regarding the importance of pre-school education are left behind today, and both the state and private organizations started to pay more attention to this field. The issue that is strongly underlined is now how the quality of pre-school education may be improved. The information and experience gained in this period where psychological, physical and social

**CORRESPONDENCE** Meryem ALTUN ✉ Email: mrymltn@hotmail.com

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development is rapid, have a significant effect on how the following education life will be shaped (Özmen, 2011b).

In this period of rapid psychological development, cognitive concepts of “attention” and “concentration” gain importance. When the literature is visited, it is seen that attention is a multi-dimensional cognitive aspect, and it is effective in learning, recalling, communication, problem solving, perception and all other cognitive fields. The importance of concentration is emphasized especially for success at school (Özmen, 2011b).

According to Özdoğan (2004), individuals can be trained towards concentrating on a subject and their existing capacities can be improved. Concentration on a subject may be taught via education starting from early ages.

Various theoreticians have defined the concept of “attention”: Ott (1994) defined attention as “the level of orienting our sense organs towards a person, event, information or behavior”; Dorsch (1987) defines it as “a consciousness state oriented towards an object (event, situation, idea, etc.)”; whereas Cammann and Spiel (1991) define it as “orientation of thought to a single point (event, object, situation) for a certain amount of times and the ability to not orient towards other stimulants as much as possible”. We see that the common theme of the definitions of scholars is the conscious orientation of thought towards a specific event, situation, etc. (Özmen, 2011a).

Researchers state that the turning point of the development of attention is the age 6-7 (Özmen, 2015). Wagner (1991) states that the systematic strategies of attention are established between the ages of 5 and 7. They argue that developments are seen in selective attention in parallel to aging in children of age 6-14, the psychological development in this period evolves from the pre-operational period to tangible operations period and finally the abstract operations period, and the modification and continuation of the attention process is explained by Piaget’s states of psychological development. Attention of small children is rather towards discovering their environments. The attention behavior in later ages is more active, rational, systematic, planned, continuous and oriented towards goals (Wagner, 1991).

According to the results of research, the attention span of children of ages 5-7 is 15 min., while it is 20 min. for children of ages 7-10 and it changes in the range of 25-30 minutes for children of ages 10-12. There are also researchers who suggest that a precise value cannot be provided in this issue (Nickel, 1991).

Ettrich (1991) reports that the systematic strategies of attention are established between the ages 5 and 7. They describe a relationship between the development of concentration and game development. Thus, the increasing complexity of children’s games in parallel to their age increases their concentration levels.

It is highly difficult for children to maintain their attention during education and training. Individuals get bored after some time and they get distracted. This in turn obstructs perception and learning permanently. One of the benefits of learning by playing is its quality of intensifying attention. As games facilitate the transition students from a passive state to an active one, they achieve more attention in comparison to other learning methods. It has been reported that especially brain teasers are games that provide improvement of strategy



development, planning, reasoning, logical comprehension, visual-spatial thinking, creativity, attention-concentration, memory and recollection in children and adults, and allow implementation in the kinesthetic area. It was also reported that it is important for the National Education Ministry to include “brain teasers” course as an elective course in the school year of 2012-2013 and the course was one of the most selected ones (TÜZDER, 2013).

Concentration issues are noticed usually when the children start primary schools. This is because tasks in school require children to work on a subject by concentrating on it for a certain time. Therefore, not being able to concentrate poses a significant problem especially in school years for children, teachers and parents. Thus, special attention is needed to improve the ability to concentrate starting from the pre-school period. This way, it will be possible to reduce the amount of educational issues that might arise in the following years. A concentration training provided to children will help prevent a set of issues that might arise in their school lives later. In this context, the purpose of this study is to investigate the effects of brain teasers on pre-school children’s attention spans.

## **Method**

### ***Research Model***

The research model is an experimental one. “Pre-test/post-test model with a control group” was used in this study. The effect of the operation is tested via the study conducted on two groups in this experimental design. The measurements of the subjects regarding the independent variable (attention span) are taken using a pre-test before the implementation and post-test after the implementation using the same subjects and measurement tools (Büyüköztürk et al., 2009).

### ***Population and Sample***

The population of the study is pre-school children of age 6. The sample of the study is a total of 213 students in the Merkez Kindergarten of the district of Şarkışla in the province of Sivas consisting of 113 in the experiment group and 100 in the control group selected via the purposive sampling method. This school has a student body of 240 as morning and after-noon groups. As a result of the pre-test, it was seen that attention spans of all students were close to each other and there were no significant differences. The groups were organized into two groups (120 experiment – 120 control) taking class sizes into account. However, at total of 27 individuals consisting of 7 from the experiment group and 20 from the control group were not able to attend the post-test for various reasons. The numbers of students in the groups and their distributions based on sex are given in the table below:

**Table 1.** Distribution of Experiment and Control Groups Based on Sex

Experiment Group	Female	Percent	Male	Percent	Total	Percent
	56	49.6%	57	50.4%	113	100%
Control Group	Female	Percent	Male	Percent	Total	Percent
	45	39.8%	55	48.7%	100	100%

### *Data Collection Tools*

FTE-K (Attention Test for Children of Age 5-6): In this test developed by Raatz and Möhling (1971) aiming to measure the concentration abilities of children, children are asked to find and mark the pears among a mixture of apples and pears in 90 seconds (Kuscu, 2010). This test was implemented on 30 children of age 5-6 in Turkey by fourth year students at the Faculty of Educational Sciences of Ankara University in order to understand the instructions and implement the tests. The reliability of the FTE-K test was determined via the test-retest method. The correlation between the first and second test implementations is  $r = 0.79$ . The scale was implemented on each child by each researcher individually (Kaymak, 1995). FTE-K Concentration Test is implemented on each child by the researcher individually or in small groups. The pears drawn by the child within 90 minutes constitute the raw score.

### *Implementation*

The pre-test and post-test implementations of the Attention Test used in the study were made in small groups (5-10) in presence of the students' teacher in a silent room. The researchers firstly worked on a sample shape with children and then the scale was implemented. As soon as the researcher provided direction, they started the stopwatch and waited for the children to mark the pears for 90 seconds. The experiment group in the study was given the brain teaser curriculum 3 times a week for an hour each time, for 10 weeks. The games in the scope of the curriculum were the following: Quoridor and QuoridorKid, Batik-Batik Kid, Hedef 4, Katamino-Winomino, Equilibrio&Architecto, Make'n Break, ColourCode, Camouflage, Hide&Seek (Prince Dragon, Cat Mouse, Magic Forest), Bricks, Ramses II, Zingo, and Kapla. The games added to the curriculum were games such as: Jenga, Russian Block, T Tangram, Mikado, Dokuz Taş, Mangala, IQ-improving brain teasers for pre-school children 1, Masal labirent, Mumyalar müzesi, Fun brain teasers, Şekiller ve Renkler yürüyor, Nim.

The teachers were briefed about the implementation of activities, the first activity was implemented under the supervision of the researcher, and other activities were implemented directly by teachers. Attention was paid to providing children with reinforcing statements such as "good job", "very good" and "you did it correctly". The activity was implemented individually later to the children who missed it for any reason. No implementations were made on



children in the control group during the course of the study. Post-test implementations of the scales were made in a similar manner.

### *Analysis of the Data*

The obtained data were organized and analyzed in the SPSS 22 software after being transferred to the computer environment by the researcher. Dependent samples t-test was used in order to analyze the differences between the experiment and control groups, while percentages, frequencies and means were used for demographics.

### **Findings**

This section presents the findings of in-group comparisons of the attention span pre-test and post-test scores of the experiment and control groups.

**Table 2.** Comparison of the Attention Span Pre-Test and Post-Test Scores of the Experiment Group

<b>Group</b>	<b>Measurements</b>	<b>N</b>	<b><math>\bar{X}</math></b>	<b>S</b>	<b>sd</b>	<b>t</b>	<b>p</b>
Experiment Group (Brain Teasers)	Attention Pre-Test	Span	113	24.79	11.44	112	<b>.00</b>
	Attention Post-Test	Span	113	35.35	8.89		

Table 2 shows the results of the dependent samples t-test used to determine whether there was a significant difference between the attention span pre-test and post-test scores obtained from the experiment group. As a result of the analyses, the mean pre-test score was found as  $\bar{X}_{pre}=24.79$ , while the mean post-test score was found as  $\bar{X}_{post}=35.35$ . It was seen that the t value obtained in regards to the difference between mean scores ( $t=-12.98$ ) was significant on level of .05 ( $p<.05$ ).

**Table 3.** Comparison of the Attention Span Pre-Test and Post-Test Scores of the Control Group

<b>Group</b>	<b>Measurements</b>	<b>N</b>	<b><math>\bar{X}</math></b>	<b>S</b>	<b>sd</b>	<b>t</b>	<b>p</b>
Control Group	Attention Pre-Test	Span	100	23.26	11.25	999	<b>.517</b>
	Attention Post-Test	Span	100	24.08	10.70		

Table 3 shows the results of the dependent samples t-test used to determine whether there was a significant difference between the attention span pre-test

and post-test scores obtained from the control group. As a result of the analyses, the mean pre-test score was found as  $\bar{X}_{pre}=23.26$ , while the mean post-test score was found as  $\bar{X}_{post}=24.08$ . It was seen that the t value obtained in regards to the difference between mean scores ( $t=-650$ ) was not significant.

### **Discussion And Conclusion**

As a result of the study, it was seen that there was a significant difference in favor of the experiment group between the attention spans of children who received the brain teasers curriculum and children who received the National Education Ministry Pre-School curriculum. This result shows the effectiveness of brain teasers in improving the attention span.

As gender roles do not settle in this age group, differences based on sex were not provided. According to Davies and Parasuraman (1982), attention is affected by the variable of age rather than sex (Yaycı, 2007). According to the study by Gözalan (2013), the “Game-Based Attention Training Program” is effective in increasing the attention spans of children of ages 5 and 6.

Pasco Rakic, who is a neurobiologist at the University of Yale asserts that information that will be heavy for their psychology should not be asked from small children of Americans, for “they will learn it in college anyway and we should allow them to PLAY for now.” According to Rakic: “it is much easier to train your children at early ages rather than later ages.” It is indicated that early stimulation of the brain with jigsaw puzzles, visual presentations, music, foreign language learning, chess, painting, scientific research, mathematics games, writing and similar activities strengthens synaptic connections (related to learning) in the brain (Solso et al, 2014). In the light of these studies, it may be seen that games are not only tools for entertainment, but they are also seen important as they create a learning environment for children. The child who plays games pays attention, and the child who pays attention is more successful.

### ***Recommendations***

Attention may be improved by sharing time with children and playing various games with them. Opportunities should be created for children’s need to play games and relax. Families may provide support in this issue by sharing time with their children and playing various games with them. There are numerous toys and books in the market that may be utilized in activities towards this issue, and they may be chosen based on the child’s age. Certain shapes may be obtained by combining pieces, children may develop their own games and activities, or jigsaw puzzles, lego blocks, domino games and die games may be utilized.

### **Disclosure statement**

No potential conflict of interest was reported by the authors.

### **Notes on contributors.**



**Meryem ALTUN** holds on PhD in educational sciences and now is an Research Assistant at Gazi Üiversity Faculty of Sports Science, Ankara, Turkey. mrymltn@hotmail.com

**Muhsin HAZAR** holds on PhD in educational sciences and now is an associate professor at Gazi Üiversity Faculty of Sports Science, Ankara, Turkey. muhsin@gazi.edu.tr

**Zekihan HAZAR** holds on PhD in educational sciences and now is an Research Assistant at Gazi Üiversity Faculty of Sports Science, Ankara, Turkey. zekihanhazar84@gmail.com

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