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COMPARE THE VISUAL PERCEPTION OF CHILDREN WITH AND WITHOUT CEREBRAL PALSY WITH NORM IQ

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ABSTRACT

Purpose: *The present study compared the visual perception of children with and without cerebral palsy with normal intelligence.* ***Method:*** *For this purpose, 30 children with and without cerebral palsy with normal IQ were selected using accessible sampling method. Raven's Progressive Matrices were used to measure intelligence and TVPS-R visual perception test to measure visual perception. Data were analyzed using t-test.* ***Findings:*** *Analysis and comparison of the results showed that there was a significant difference between the mean scores of students with and without cerebral palsy with normal IQ. Therefore, the null assumption that equals mean age of visual perception and visual perception benefit as well as equality across test subscales is rejected and with 99% confidence, we conclude that there is a statistically significant difference between the comparable averages.* ***Conclusion:*** *The results showed that age of visual perception and visual perception profits of children with normal IQ without cerebral palsy and their performance in 7 sub-tests of visual perception are higher than children with cerebral palsy with normal IQ.*

Keywords: *Cerebral Palsy, Visual Perception, Normal IQ, Elementary grade.*

INTRODUCTION

Out of the five senses, visual sense is the most important factor in understanding and receiving information from the environment, in supreme vertebrates especially in human. This sense plays an important role in regulating many human behaviors, including behaviors related to movement in the environment, orientation and perception of the situation (Cullen, Smith 2010). About 40 percent of the information that is processed through the brain through different senses is visual information (same source) vision is one of the senses that allows one to understand what is happening outside the body with the outer space. Perception means human knowledge and awareness of the outside world and the inner world and it has long been the basis of human cognition. (The same source) Therefore, the ability to analyze and make sense and to use visual information properly (proper visual perception) is essential to confront the environment (Ghanbari, 2013). Vision perception is a complex device associated with object recognition and location in space. (Simin Ghalam, Ali Bakhshi. 2011)

The role of visual perception is very important in motor activity and growth. (Salawati, 2015) It is estimated that approximately 1.4 million children worldwide have significant visual impairment (David Diofris ney et al., 2014).

Meanwhile, among various diseases in neonates, cerebral palsy is a sensory-motor disorder. (Styres, 2003) Children with cerebral palsy have limited activity due to motor problems. (Arturo Prado et al., 2017) And for this reason, the perception process is often disrupted in these children and the individual develops a cognitive impairment. (Styres, 2003) Children with cerebral palsy

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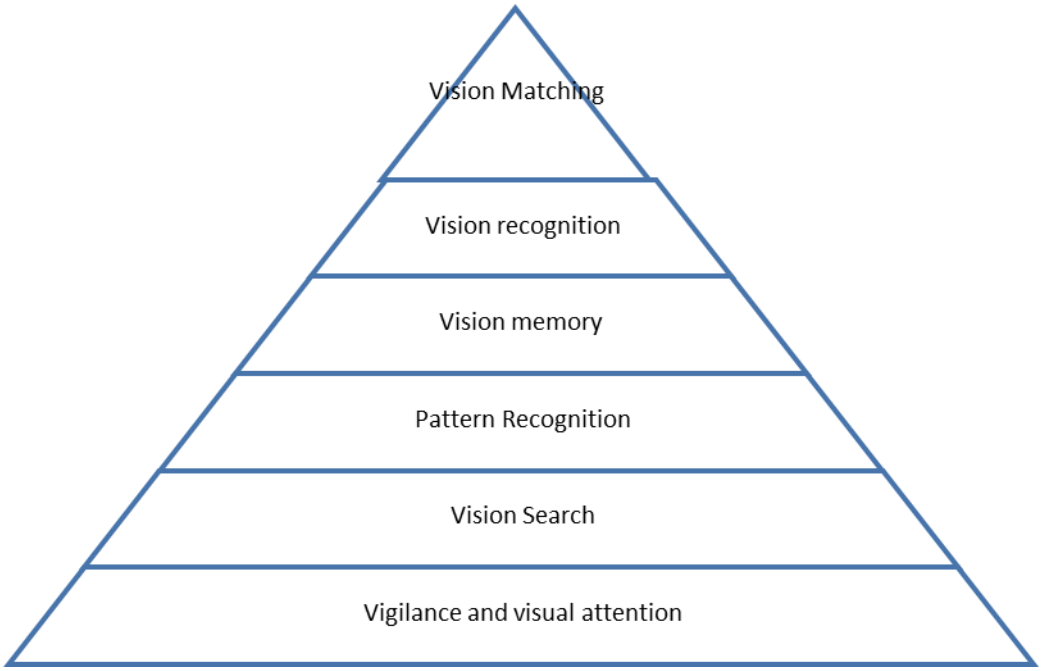
are at risk for disruption of multiple elements of the visual system, including the primary visual pathways (eyes, optic nerve, thalamus, optical radiation, and primary visual arcs), areas of visual aggregation, and the motor system of the eyes. (David Francis and Dagnesia, 2014) According to statistics, cerebral palsy is the most common physical disability during infancy, affecting 3 children per 1,000 babies in the United States. Cerebral palsy is a motor and postural disorder caused by permanent and progressive damage to the developing brain. The appearance of cerebral palsy can be a disorder of the brain or body in general or a disorder in the way people walk, recognize, grow or feel. It should be noted that visual perception allows the living creature to gain knowledge and information about its surrounding environments by sensing the light specified by surfaces (Smith and Allen, 2005). Vision perception is the complete process responsible for perceiving and understanding visual stimuli (Wilding et al., 2002).

Vision perception plays an important role in academic learning especially reading, a number of children face problems in tasks that require the use of visuals in distinguishing the shapes and geometric designs. Some succeed in doing this kind of thing and instead fail to distinguish the letters and words through vision. Vision perception is critical not only for academic learning but also for adaptation to the environment. (Fariaroo Rakhshan, 2000)

The hierarchical model of visual perception skill development indicates that to reach the highest level, i.e., adaptation through vision, the said steps occur sequentially.

The Hierarchy of Visual Perception Skills Development (Smith, 2005)



(Warren, 1993)

A study was conducted on a group of children with cerebral palsy using a visual perception test consisting of six object recognition and two visual constructive tasks. What has been shown is that visual impairment is more common in children with cerebral palsy (Styers et al., 2002). In addition, a study was conducted to investigate the differences in visual perception in three groups of children with cerebral palsy, the mentally retarded group and the normal group in

order to investigate the differences in visual field perception. The performance of a group of children with cerebral palsy, mental retardation and normal was compared according to the four sections of visual perception.

1- Figure - context communications
2- Shape stability
3- Spatial condition
4- Spatial relations

The figure-context section was tested through Tachistoscope. Shape stability and spatial states were tested using visual perception growth test and the spatial relationships were tested by forcing each child to reconstruct a geometric installation plan. The results showed that subjects with cerebral palsy and weaker mental retardation scored higher on each of the four visual perception segments also, the person with cerebral palsy showed less ability in the tasks of visual perception than the person with mental retardation. The findings support the hypothesis that parts of visual perception are impaired in a child with cerebral palsy (Darwatsky et al., 1992). Nicos Kozis et al. (2007), who conducted a study on visual functioning and visual perception in children with CP cerebral palsy, first divided children into three groups without congenital cerebral palsy.

A. Children with paralysis of all fours
B. Children with bilateral paralysis
C. Children with unilateral paralysis

Then they collected information on patient history, IQ, visual acuity, near and far, eye position and eye movements, squares of vision, and visual perception. The results were compared with a control group of normal children. The results showed that children with cerebral palsy had poor visual skills without severe mental retardation. Another study examining the visual impairment profile of children with cerebral palsy found that awareness of this profile helps professionals to increase their understanding of potential visual impairments in a specific subset of children with paralysis. (Frey Sen et al., 2014)

Regarding the importance of visual perception in learning and developmental activities and development of education, the present study aims to evaluate the visual perception skills of a group of 9-11 boy children with and without cerebral palsy with normal IQ in Tehran with the help of TVPS-R test. Because according to the studies mentioned, children with cerebral palsy are weaker in visual perception skills than normal children therefore, according to the studies, it can be said that these children are most at risk of learning and educational problems. Therefore, it is expected that with the help of the TVPS-R test, thought-provoking and creative therapists study the results of this group of children and look for ways to repair those problems. What is seen in some clinics is that what is usually learned by the student in the classroom, using various books, depends on his or her own experience and interest in using the experience of those around him and his colleagues to accompany the treatment work Perform routine and repetitive for different clients this study helps people in this group find out more about the weaknesses of their cerebral palsy by doing this test and it has created thinking, creativity and diversity in the treatment plan and the therapist can finally see the outcome of his or her work

before starting treatment with the help of the TVPS-R test and change or continue his or her treatment plan to help children with cerebral palsy.

Importance and necessity:

Dysfunction in visual perception skills can cause secondary mental disability in children with normal cerebral palsy. On the other hand, there is a relationship between visual perception, reading, employment, and social interaction skills and for these tasks, one has to be able to process visual stimuli well, these problems can lead to learning disabilities, low self-esteem, and various social and emotional problems. (Dalvand et al., 2016) The prevalence of cerebral palsy in the world has been reported at 2-3 per thousand and in Iran about 2.06 per thousand. (Sajedi et al., 2013) The problems associated with cerebral palsy vary depending on the severity of the lesion and lead to motor, visual, auditory, seizure and other disorders. Visual problems in children with cerebral palsy are relatively high. Visual disorders can occur in the form of blurred vision, blindness, limitations in eye movements and tracking of objects and images, lacunae, eye irregularity, cortical blindness, and impaired visual perception skills. (Dalvand et al., 2016) Vision perception is the ability to interpret information received through vision which its role in having a completely independent life is undeniable. Vision perception plays an important role in daily activities. (Behzadi et al., 2014) and also has a great impact on the development of basic child skills such as motor development, writing, reading, mathematics, etc. (Hawai et al., 2009).

METHOD:

The present study is a post-event type. The statistical population of the study consisted of students with and without cerebral palsy with normal intelligence IQ in the school year of 2006-2007 in the age range of 9-11 years.

Sample and sampling method: Through the available method among the students of two boys' schools of cerebral palsy who were selected after assurance of their visual health by studying their health project 11 people who had normal IQ after performing Raven test. Due to the limitation of the author's sampling, Valiasr (AS) clinics had to select 8 patients with normal vision and IQ as the available sample to collect the student with cerebral palsy with IQ that generally there were 15 students with cerebral palsy and normal IQ. Also, students without cerebral palsy were selected using a convenience sampling method from a boys' school that after making sure that their eyesight was correct, Raven test was performed, which consisted of 15 normal subjects.

Research tools:

Raven test:

The instrument used was Raven's progressive matrices intelligence test and R-Tvps visual perception test.

In this study, the Raven test was performed to evaluate the intelligence proficiency of the subjects individually.

TVPS-R Visual Perception Skill Tests:

The Visual Perception Skills Test (TVPS-R) was first published in 1982 and is a measurement tool used by various experts to measure visual perception. The TVPS-R test is applicable to children ages 4 years to 12 years and lasts 11 months and TVPS-R is a non-language test and is not

sampled based on race, culture, gender, or education, the instructions require only the minimum amount of language and can be provided in any language. If the person being tested cannot understand or be able to hear verbal instructions, or is otherwise disabled, testers can provide instructions either by pantomime or by movement in two hands. To get to know each tested person with the problem of the way of performance of each sub-test begins with a practical test page.

The test consisted of 7 sub-samples that each of sub-samples consists 16 pictures that the students are given 10-15 seconds to answer each one. Each student is given 1 minute break between each sub-test.

Like the TVPS test, the materials of each sub-test are sorted by problem. During the test, the test pages are equipped with a tripod to look forward, not down, and also the part and size of the individual profile form has not changed. The TVPS-R test, such as the initial TVPS test, contains seven subtypes of perceptual-visual ability retained, as follows:

1. Vision diagnosis
2. Visual memory
3. Spatial-Vision Communications
4. Visual Sequence Memory
5. Shape recognition-field of vision
6. Complete or complete vision
7. Stability of vision shape

Subtests with 5 alternatives will be stopped after 4 consecutive mistakes and each subtitle with 4 choices will be stopped after 3 consecutive mistakes. The highest raw score is 16 and the lowest is 0. Also, TVPS-R is not a test to measure a tester's vision, but merely a measure of their ability to interpret what they see, Visual impairment can distort what they see, which in turn affects the performance of the test subject on the TVPS-R test. If a visual impairment interferes with the correct and accurate interpretation of perception, the test subject should be referred to an ophthalmologist or an ophthalmologist.

Comparison of the components of age of visual perception in two groups of normal and cerebral palsy subjects

The mean and standard deviation of the research data by component in two research groups are reported in Table 1.

Table 1. Mean and standard deviation scores of the components of age of visual perception

Standard deviation	mean	Standard deviation	mean	Cerebral palsy normal
20/32	13/89	99/34	73/124	Vision differentiation
51/20	80/89	09/31	27/123	Visual memory
17/37	47/107	60/34	60/134	Spatial Vision Relations
08/29	93/71	68/40	80/108	Stability of vision shape
41/38	60/90	95/26	27/135	Visual Memory Sequence
99/30	80/77	05/31	67/129	The role of the field of vision
67/25	93/71	55/38	67/118	Complete the vision

Multivariate analysis of variance was used to compare the seven components of age of visual perception in the two groups of research, considering that the dependent variable (age of visual perception) is multi-level.
Before performing the analysis of variance, the assumption of a significant relationship between the levels of the dependent variable is examined, the results of which are presented in Table 2.

Table 2. Correlation coefficients between the components of age of visual perception (n = 30)

7	6	5	4	3	2	1	
						1/000	.1 Vision differentiation
					1/000	0/627**	.2 Visual memory
				1/000	0/557**	0/592**	.3 Spatial Vision Relations
			1/000	0/548**	0/370*	0/494**	.4 Stability of vision shape
		1/000	0/648**	0/569**	0/521**	0/516**	.5 Visual Memory Sequence
	1/000	0/569**	0/421*	0/551**	0/709**	0/775**	6From the field of vision
1/000	0/758**	0/580**	0/437**	0/556**	0/659**	0/720**	.7 Complete the vision

01/0 > P ,** 05/0 > P *

Regarding the assumption that there is a significant relationship between the levels of dependent variables, the results of one-way analysis of variance are presented in Table 3.

Table 3. Multivariate and univariate analysis of variance for age of visual perception

Univariate analysis of variance						
Completion Sight	The role of the field of vision	Visual Memory Sequence	Stability of vision shape	Spatial Vision Relations	Memory Sight	Differentiate Sight
$F_{(1,28)}$	$F_{(1,28)}$	$F_{(1,28)}$	$F_{(1,28)}$	$F_{(1,28)}$	$F_{(1,28)}$	$F_{(1,28)}$
15/275**	20/964**	13/593**	8/155**	4/283*	12/111**	8/408**
0/353	0/428	0/327	0/226	0/133	0/302	0/231

*P < 0/05,-**P < 0/01

Note: Multivariate F ratios are obtained from the Wilks Lambda approximation.

Statistical results:

- **Multivariable:**

Given that the calculated index F (3.916) is greater than 0.01 F with degrees of freedom 22 and 7 (3.59) therefore, the null hypothesis of equality of age for perception of disease in both normal and cerebral palsy subjects is rejected with 99% confidence.

- **Univariable:**

1. Vision differentiation: Since that the calculated F index (8.408) is greater than 0.01 F with degrees of freedom 28 and 1 (7.64) Therefore, the null hypothesis that equivalence of visual differentiation in both normal and cerebral palsy subjects is rejected with 99% confidence. Therefore, based on available data, the mean of this component in normal subjects (124/73) is higher than in subjects with cerebral palsy (89/13).
2. Visual memory: Given that the calculated index F (12/111) is greater than 0.01 F with degrees of freedom 28 and 1 (7.64) therefore, the null hypothesis that visual memory is equal in the two groups of normal and cerebral palsy subjects is rejected with 99% confidence. Therefore, according to the available data, the mean of this component in normal subjects (123/27) is higher than in subjects with cerebral palsy (89/80).
3. Spatial-vision relations: Regarding that the calculated F index (4.28) is greater than F0.05 with degrees of freedom 28 and 1 (4.20), then the null hypothesis that equivalence of visual-spatial relationships is normal in both normal and cerebral palsy subjects is 95 Percentage is rejected. Therefore, according to the available data, the mean of this component in normal subjects (134/60) is higher than in those with cerebral palsy (107/47).
4. Stability of vision shape: Given that the calculated index F (8/155) is greater than 0.01 F with degrees of freedom 28 and 1 (7.64) therefore, the null hypothesis that equality of vision is stable in both normal and cerebral palsy subjects is rejected with 99% confidence. Therefore, according to the available data, the mean of this component in normal subjects (80/80) is higher than in those with cerebral palsy (71.93).
5. Visual Memory Sequence: Regarding that the calculated index F (1359/59) is greater than 0.01 F with degrees of freedom 28 and 1 (7.64) therefore, the assumption of null equivalence of visual memory sequence in both normal and cerebral palsy subjects is rejected with 99% confidence therefore, according to the available data, the mean of this component in normal subjects (135/27) is higher than in those with cerebral palsy (90/60).
6. Role of field of vision: Regarding that the calculated index F (20/964) is greater than 0.01 F with degrees of freedom 28 and 1 (7.64) Therefore, the null hypothesis that equality of the role of vision in the two groups of normal and cerebral palsy subjects is rejected with 99% confidence is rejected. Therefore, according to the available data, the mean of this component in normal subjects (129.67) is higher than in subjects with cerebral palsy (77/80).
7. Complete the vision: Regarding that the calculated index F (155/27) is greater than 0.01F with degrees of freedom 28 and 1 (7.64) therefore, the null hypothesis of equality of vision completion in both normal and cerebral palsy subjects is rejected with 99% confidence. Therefore, according to the available data, the mean of this component in normal subjects (118.67) is higher than those with cerebral palsy (71.93).

RESEARCH RESULTS:

- Age of perception of the disease in normal subjects and cerebral palsy are different.
- The visual differentiation of normal subjects is higher than subjects with cerebral palsy.
- The visual memory of normal subjects is higher than the subjects with cerebral palsy.

- The visual spatial relationships of normal subjects are higher than those of subjects with cerebral palsy.
- The visual stability of normal subjects is higher than subjects with cerebral palsy.
- The visual memory sequence of normal subjects is higher than subjects with cerebral palsy.
- The role of vision in normal subjects is higher than subjects with cerebral palsy.
- Visual completion of normal subjects is higher than subjects with cerebral palsy.

CONCLUSION:

Cerebral palsy represents a large group of chronic abnormalities in locomotor and motor development that restricts one's activity and is attributed to non-progressive disorders.
Movement disorders in cerebral palsy can be associated with disorders of feeling, perception, cognition, communication, behavior as well as seizures and secondary skeletal muscle problems. Visual impairment has a significant impact on motor development and skills acquisition. Delay in various motor developmental milestones such as sitting, crawling, standing and walking in children with visual impairments has been reported (Salavati et al., 2017). Impaired visual perception can cause cerebral palsy in children with natural intelligence of secondary mental retardation (Sayyadi, 2011).
A study by Luch and Daman (2004) on the comparison of visual perception of children with and without cerebral palsy showed that children with cerebral palsy had a lower level of visual perception in borderline IQ. Studies have also shown that children with cerebral palsy not only have poorer visual perception, but are also lower in speech. Also, research on visual perception of normal children, cerebral palsy and mentally retarded children showed that the cerebral palsy group and mentally retarded children performed poorer than the normal group and even the cerebral palsy group has done worse in the field of visual perception than the mentally retarded children (Darwatsky et al., 1992).
In a study conducted by Khodabandeh et al. (2015) with the aim of correlating visual perception subscales with the components of accuracy and speed of reading skills in cerebral palsy students, the results showed that the relationship between each of the visual perception skills with the accuracy and speed of reading skills of cerebral palsy students was significant and significant. And visual perception exercises can be used to increase reading accuracy and speed (Khodabandeh, 2015).
Also, Costa and Netura's (2012) in a study of children with cerebral palsy shows that there is a correlation between the severity of motor impairment as measured by the gross motor function classification scale (GMFCS) and the presence of visual impairment and its severity. There are also indications that different subtypes of cerebral palsy have different visual phenotypes.
But a study by Dalvand et al. (2016) shows that visual perception in children with cerebral palsy is not dependent on their level of motor function. That is, further impairment in coarse motor function does not exacerbate impaired visual perception in these children.
It should be noted that in their research they concluded that visual perception is related to one's age, gender and social status (Gholamian et al., 2010).
As mentioned earlier, impaired vision perception can cause secondary cerebral palsy in children with normal intelligence.

Identifying factors affecting visual perception and early treatment skills in these children can prevent learning disorders, slow the process of treatment, and cause secondary problems.
Accordingly, the findings of this study regarding the poor performance of children with cerebral palsy in the areas of vision perception test in children with cerebral palsy are consistent with most of the above findings.
Since no research has been conducted on visual perception skills in children with cerebral palsy in Iran, this study has attempted to focus on this issue to make information available to teachers, therapists and education authorities in order to take a step in the educational process. And rehabilitate these loved ones.
The purpose of this study was to compare visual perception among students with and without cerebral palsy with normal IQ. What was found showed that students without cerebral palsy performed better on visual perception, visual perception age, and seven subscales of visual perception than students with cerebral palsy. * Regarding that the visual perception test should be assessed every 3 months between the visual perception benefit and the visual perception age of normal children and children with cerebral palsy. However, due to the prevalence of children with cerebral palsy studied and the inability of couples to match the age of the two groups, this was omitted.

- Due to the lack of permission to test girls with cerebral palsy, it was not possible to compare gender in this study. Because only three schools of children with cerebral palsy were allowed to author.
- Due to the impossibility of achieving one type of cerebral palsy, all groups of cerebral palsy were used in this study.
- According to the findings of this study, it is recommended that psychologists, therapists, and teachers work together to improve the visual perception of children with cerebral palsy. Also, according to the research done during the research it seems necessary.
- Regarding that cerebral palsy has different types of severity, it is desirable to investigate the difference in visual perception of each type of cerebral palsy with that of other types of cerebral palsy.
- It should be noted that no research has been conducted so far on the difference in visual perception of normal children and cerebral palsy in Iran and this research could be the basis for further research in this regard.

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