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COMPARING VISUAL PERCEPTION IN CHILDREN WITH LEARNING DISORDERS, ADHD AND NORMAL CHILDREN IN TABRIZ DISTRICT ONE

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ABSTRACT

The present study aims to compare the visual perception of children suffering from learning disorders, hyperactivity, and normal children. This research is a casual-descriptive study. The participants of this study include 47 male and female students, 7-9 years old, in the Learning Disorders Center in District One of Tabriz that was selected using the availability sampling technique. To match the participants, 50 hyperactive students and 60 normal students were selected through stratified random sampling from four schools affiliated with branch 1. The sum of these students formed the research sample. The Frostig Developmental Test of Visual Perception was used for measuring the participants' visual perception. In addition, hyperactive students were selected through Connors' test rating teachers. Research results revealed a significant difference between visual perception scores among three groups of children, meaning that visual perception among normal children was much better than children suffering from learning disorders and hyperactivity.

Keywords

Visual perception, learning disorders, hyperactivity disorder.

Introduction

Neurodevelopmental disorders are a set of diseases that begin during the developmental stage of life. These disorders usually appear in the early stages of development, often before the child enters primary school, and are characterized by developmental defects that disrupt the child's personal, social, academic, or professional performance. These developmental disabilities range from specific learning restrictions or control over executive functions to general impairments in social skills or intelligence. Neural and developmental disorders often occur together and most children suffering from attention-deficit/hyperactivity (ADHD) also experience special learning disabilities (American Psychiatric Association, 2014).

Attention Deficit Hyperactivity Disorder (ADHD) is one of the most significant and prevalent psychiatric disorders in children. More than 50% of referrals to child psychiatric clinics and 3-5% of school-age children suffer from this disorder (Sadok & Sadok, 2009). This disorder affects one's family life, education, and social relationships. If treated well, the personal and social functions of the patient suffering from this disorder can be significantly improved, and their symptoms can be considerably reduced. However, if the symptoms remain, they can have irreversible consequences (Barkley, 1994; Weiss & Hechtman, 1993). If left untreated, this disorder can cause various issues in different educational contexts, including poor academic performance, repetition of grades, dropping out of school, weak friendships and poor family relationships, anxiety, depression, aggression, delinquency, underage drug abuse, and law-breaking behaviors. This disorder can also lead to the development of other disorders (Cantwell, 1996; Najafi, Foolad Chang, Alizadeh, & Mohammadifar, 2009). Besides, these children are also prone to antisocial

personality disorder, alcoholism, and other interpersonal and psychological problems. Findings in this area certainly indicate that this disorder in adults is equivalent to or remnant of childhood problems (Kratochville & Morris, 2005). This disorder is developed between the ages of 2 to 4 and is one of the most common childhood neurobehavioral disorders affecting a large portion of the world's population (2.5-5% of children). It has been reportedly more common among boys than girls (www.DSM5.org 05.05.2015). This ratio was 9 to 1 in clinical samples and 4 to 1 in epidemiological studies (Cantwell, 1996). In an epidemiological study in the United States, the male to female patient ratio was 5 to 1, and the prevalence of this disorder was 6.7% (Moldins, 1999). Attention Deficit Hyperactivity Disorder may be associated with learning problems (reading, mathematics, language, and coordination), and both ADHD and learning disorder must be diagnosed in such cases (Gumpel & Reid, 1998).

Another disorder related to neurodevelopmental disorders is learning disorder. Children suffering from learning disabilities form a heterogeneous group. What they all have in common is that they have difficulty learning topics presented in school. Learning disabilities are almost always followed by academic failure and may lead to difficulty in writing or speech perception. These disabilities may be manifested as total disabilities in listening, thinking, speaking, spelling, or doing mathematic calculations (Beitchman & Young, 1997; Afrouz & Ebadi, 2000). Individuals suffering from learning disabilities have many social and economic disadvantages. For instance, economically, in a census done in 1999 in primary school, there were about one million four hundred and thirty-two thousand students who had failed their school grade, which had caused many economic damages to Education Organization (Dadsetan, 2000). Learning disabilities, as the name implies, are diagnosed if a person has certain when it comes to the ability to perceive or processing information properly. This neurodevelopmental disorder first manifests itself during the beginning years of formal education. It is characterized by persistent and disruptive problems in learning basic academic skills in reading, writing, and/or mathematics. Based on DSM-5[1], the prevalence of special learning disorders in academic fields including reading, writing, and/or mathematics in primary school children of different languages and cultures. The prevalence of these disabilities in adults was unknown but appeared to be approximately 4% (American Psychiatric Association, 2014).

Visual impairment is one of the components that may appear in children suffering from developmental disorders (American Psychiatric Association, 2013). To do the activities of daily life well, one needs to process visual information. If they have problems processing visual information, their performance in daily life activities, including eating, dressing, driving, social interactions, employment, reading, writing, etc., is impaired (Umphred, 2007). Miller (2004) conducted a study entitled "Learning Disorder" and showed that visual impairment was related to reading disorders. Visual information processing or visual perception refers to visual cognitive skills that extract and organize the visual information received from the environment and coordinate them with other higher-level cognitive functions and sensory information.

So far, many studies have examined visual cognitive impairment in children suffering from developmental disorders and reported a high rate of visual cognitive impairment in these children (Hosseini Gouran Abadi, 1996; Hoshyar Adinehzadeh & Naderi, 1995; Mohammadi, Ashayeri & Esteki, 2011). According to previous studies, quantitative studies have investigated visual perceptions in children suffering from ADHD and learning disabilities. Therefore, the present study aimed to compare the visual perception of children suffering from attention deficit and learning disabilities with normal children. The results of this study can be scientifically used in various studies and lead to scientific development and be helpful in the etiology of educational, economic, and social problems that accompany these disorders.

Methodology

[1] Diagnostic and Statistical Manual of Mental Disorders

This study has been conducted using a causal-comparative method. Three groups of children participated in this study, including children with ADHD, children suffering from learning disabilities, and normal children.

Statistical population and sample

The statistical population of this study consisted of 2700 primary school students aged 7 to 9 years who were studying in public schools in district one of Tabriz in the academic year of 2014-2015. Out of these 2700 students, 350 students with learning disabilities in the academic year of 2014 and 20l5 had been referred to the District One Learning Disorders Center (and each student was discharged from the center after 15-30 training sessions). The probabilistic sampling method and the stratified cluster sampling technique were used to select the research sample. The sample size was equal to 157 students. Out of the selected 150 children, 47 children had learning disabilities, 50 children were hyperactive, 60 children were normal.

Measurement tools

1. **Frostig Developmental Test of Visual Perception**

The Frostig Developmental Test of Visual Perception (DTVP) was used to collect the data associated with visual perception. DTVP had five subtests measuring 1) eye-motor coordination (administration time: 15 minutes); 2) figure-ground perception (administration time: 15 minutes); 3) recognition of constancy of shape (administration time: 5 minutes); 4) recognition of position in space (administration time: 5 minutes); and spatial relationships (administration time: 10 minutes). This test could be administrated individually (30-45 minutes) or in a group (less than 60 minutes). The reliability coefficients were calculated for the DTVP using the retest method. These coefficients were between 0.69-0.98 for the total score and between 0.29 (first subtest) to 0.80 (third subset). The said coefficient was calculated using the split-half method for the total score and was reportedly from 0.78 to 0.89. These coefficients were between 0.35 to 0.96 for the second subtest (highest coefficient) and the fourth subtest (lowest coefficient). The reliability of DTVP has also been calculated on a sample in South Africa. DTVP was administrated for 31 preschool children (19 males and 12 females) with a mean age of 68 months. Kuder – Richardson Formula 21 varied from 0.31 to 0.58 for different subsets. As for validity coefficients, coefficients of correlation between the test score and teachers' measure of class adjustment, motor coordination, and intellectual function were reportedly 0.44, 0.50, and 0.50, respectively. The coefficients of correlation between the test score and a Goodenough Draw-a-Dummy test were between 0.32 and 0.46 (Brand, 1989).

2. **Connors scale**

In this test, the Child Symptom Inventory (CSI-4) was used to diagnose ADHD in children with ADHD. This inventory was a DSM-IV-referenced screening tool for the most common psychiatric disorders. This questionnaire was designed by Sprafkin, Kenneth, and Gadow in 1984 and had the subscales of emotional and behavioral disorders, coping disobedience, aggressive behavior, and non-aggressive behavior disorder. It also contained two checklists, one for parents and one for teachers. The teacher checklist was used in this study, which contained a list of symptoms of 21 behavioral and emotional disorders. This scale had 11 tables named from A to L. Table A had 18 questions in both checklists (teacher and parent checklists) that met the DSM-IV criteria and had four intensities (never, sometimes, often, and very often). The first nine questions were associated with attention deficit disorder, and the second nine questions were related to hyperactivity.

Data analysis method

Descriptive statistical methods such as standard deviation and mean and inferential statistical methods such as multivariate analysis of variance (MANOVA) were used to analyze the collected data.

Findings

The present study included 157 students aged 7 to 9. Out of these children, 47 had learning disabilities, 50 were hyperactive, and the remaining 60 were normal. Table 1 displayed the

results associated with descriptive indices, i.e., mean and standard deviation, obtained from data analysis by groups.

Table 1: Descriptive data associated with visual perception components by groups

Variable	Groups	Descriptive index	
	Group of children	**Mean**	**Standard deviation**
Eye-motor coordination	Learning disorder	22.78	3.7
	Normal	27.63	3.94
	Hyperactive	21.78	4.05
Figure-ground perception	Learning disorder	10.89	4.06
	Learning disorder	15.75	2.7
	Normal	11.72	3.69
Recognition of constancy of shape	Hyperactive	5.55	2.4
	Learning disorder	9.8	2.76
	Normal	7.16	3.09
Recognition of position in space	Hyperactive	5.4	1.84
	Learning disorder	7.03	0.91
	Normal	6.76	1.3
Spatial relationships	Hyperactive	5.42	1.79
	Learning disorder	7.63	0.58
	Normal	7	0.8

The multivariate test was used to examine the difference between the visual perception components in the three groups. First, initial assumptions must be examined, such as normality and linearity. The significance level of the M box test was P=0.011 and higher 0.001 for the visual perception components. In fact, in this test, the data had the same variance-covariance matrix. The Leven test was used to examine the homogeneity of error variances. The significance level of this test was higher than 0.01 for all five variables, i.e., eye-motor coordination, figure-ground perception, recognition of constancy of shape, recognition of position in space, and spatial relationships. Therefore, it could be assumed that the variances were homogeneous.

Table 2 showed the results of the MANOVA of the visual perception components. As can be seen, the f-value was indicative of the significant difference between the three groups in terms of the previously mentioned variables.

Table 2: The multivariate test of the mean differences

Variables	Test	Value	F	Sig.
Visual perception	**Wilks-Lambda**	0.33	21.73	0.000

Given the significance of the tests in the multivariate tests, the LSD post hoc test was used to accurately determine the difference between the three groups and avoid type 1 error (rejection of hypothesis zero). Table 3 showed the results of this test.

Table 3: LSD post hoc test for visual perception components

Components	Group I	Group J (Children)	Mean	Sig.
Eye-motor coordination	Normal	Suffering from learning disorders	4.84	0.000
		Hyperactive	5.85	0.000
Figure-ground perception	Normal	Suffering from learning disorders	4.85	0.000
		Hyperactive	4.03	0.000
Recognition of constancy of shape	Normal	Suffering from learning disorders	4.24	0.000
		Hyperactive	2.64	0.000

Recognition of position in space	Normal	Suffering from learning disorders	1.62	0.000
		Hyperactive	1.35	0.000
Spatial relationships	Normal	Suffering from learning disorders	2.2	0.000
		Hyperactive	0.63	0.004

The post hoc test results suggested a significant difference between the children with learning disabilities and hyperactive children and normal children in terms of all visual perception components. According to Table 1 and a comparison of the groups in Table 3, the group with normal children had higher values than the other two groups concerning eye-motor coordination components. Whereas in terms of the components of figure-ground perception, recognition of constancy of shape, recognition of the position of space, and spatial relationships, the normal group had higher values than the hyperactive group, and the hyperactive group had higher values than the group of children with learning disabilities.

Discussion and conclusion

According to the results of data analysis, there was a difference between children with learning disabilities, hyperactive children, and normal children when it came to visual perception status (eye-motor coordination, figure-ground perception, recognition of constancy of shape, and spatial relationships). These findings were consistent with Dartaj & Rabiee (2006) studies and Miller (2004), who found a significant relationship between reading disorder and visual impairment. These findings were also compatible with the results of the study by Hosseini Gouran Abadi (1996) that displayed that dyslexic children showed more visual perception errors than normal children. Other studies with compatible results were research done by Koushesh et al. (2006), who showed that dyslexic children had problems with visual perceptions, and by Seyf Naraghi & Azizian (2005), who showed that there was a significant difference between the visual perception of dyslexic children and normal children in the Benton test.

A high percentage of learning in children is visual learning between the ages of 3.5 to 7.5 years. Any delay in the development of visual perceptions will cause some kind of cognitive damage in children. If a child has perceptional disabilities, it is necessary to identify them as soon as possible. Visually impaired children in kindergarten are graded as maladjusted in the classroom. Not only do they have problems with their education, but they are also weak in the ability to adapt to social and emotional dimensions in the classroom. Diagnosing and educating visually impaired children will prevent several academic failures and maladjustment caused by visual perception problems. Suppose children learned to overcome their visual impairments or compensate for them later in life. In that case, they will often view school as something they would fail at, suffering from a defect and even secondary emotional issues (Frostig, 2005).

Capart believes that visual impairment is due to the lack of normal perceptual-motor development (Frostig, 2005). After birth, babies begin to interact with the world through their movements, such as shaking their limbs, turning their heads, etc. If mental interactions with the outside world through body movements are not efficient or sufficient, their perceptual world will conflict with their motor world (ibid.). Perceptual disabilities are known as one of the significant causes of children's development of learning disabilities (Kirk & Chalfant, 1998). Visual perception is a process that takes place in the right hemisphere of the brain. It helps the child recognize the position of objects and shapes concerning one another and the observer. This skill aids the child in recognizing a sequence of letters and numbers in a word or the sequence of words in a sentence (Seif Naraghi & Naderi, 2005). There is a relationship between visual perception and reading and writing skills, two of the main academic skills. For an individual to read, they need to process visual

stimuli well (Khayatzadeh Mahani et al., 2010). Deficiency in visual perception lowers the visual recognition of letters and numbers, thus reducing the speed of reading words (Hauelka, Huber, and Winner, 2005).

To sum it all up, it can be stated that hyperactive children and children suffering from learning disabilities have issues with visual perception. Many of these issues can be prevented before entering primary school and can be identified and treated quickly. Education authorities are responsible for addressing these issues in preschool years and upon entering primary school. The researchers hope that the authorities take the necessary actions in this regard. Finally, the researchers would like to sincerely thank the principals and officials of schools in District One of Tabriz and others who helped conduct this scientific study.

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