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A Comparison of Receptive, Intermediate, and Expressive Language Profiles in Children with Attention-Deficit Hyperactivity Disorder

Abstract

This study compared receptive, intermediate, and expressive language profiles in children with attention-deficit hyperactivity disorder (ADHD). The statistical population consisted of all 8 to 11 years old girls with ADHD and all normal children living in Tehran. Among them, 60 (including 30 normal children, 10 children with ADHD, 10 children with hyperactivity disorder, and 10 children with attention-deficit disorder [ADD]) were selected as a sample using convenience sampling. This study used a retrospective (causal-comparative) methodology. The required data were collected using the Persian version of TOLD (Hassanzadeh & Minaei). The collected data were then analyzed using multivariate analysis of variance (MANOVA). Besides, each dependent variable was examined separately based on the test results of between-subjects effects. The results indicated a significant difference between receptive, intermediate, and expressive language profiles in children with ADHD and normal children at a 99% confidence interval. This suggests a difference between receptive, intermediate, and expressive language profiles between children with ADHD and normal children.

Keywords: *Attention-Deficit, Hyperactivity Disorder, Language Development, Language Profiles*

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Introduction

It is vital to examine the stages of child development to understand the grown-ups and characterize the social environment that influences their breeding. Children play an important role in revitalizing each generation. Human societies cannot progress unless they consider child development and education. Research on the process of language development and thinking can reveal the framework of effective and useful education and training methods and help from an educational environment that flourishes the children's abilities (Rashtchi, 2010). Many studies have been carried out on the etiology of ADHD (causes of ADHD). ADHD etiology models emphasize the interaction between genetic, biological, environmental, psychosocial, psychological, neurochemical, and nutritional factors (Castellanos, 2008). XXX (2003) stated that genetics and bio-neural variables make the biggest contribution to ADHD symptoms. Many others have suggested that the most common pathway in ADHD development is the one in which children are born with a genetic predisposition. It is also estimated that genetic factors are involved in about 80% of cases of ADHD (Mostofsky, Reiss, Lockhart, and Denckla, 1998). Although ADHD has been attributed to a wide variety of causal factors, no single variable can be considered the cause of its development. In general, major causal variables have been identified, categorized as neurological factors, toxic reactions, biological factors, and environmental factors (Anastopoulos and XXX, 1988).

ADHD is a childhood disorder that has been rapidly observed, described, evaluated, debated, and treated over the past decade (XXX, Najarian, & Davoudi, 2010). In addition to the three basic symptoms, namely inattention, hyperactivity, and impulsivity, children with ADHD are often characterized as irritable, interventionist, vibrant, disordered, aggressive, strenuous, and emotional, and are prone to various other secondary problems. The most important of these problems are low levels of academic self-efficacy/self-esteem, opposition, antisocial behaviors, peer rejection, disorders associated with family relationships, as well as specific cognitive, metacognitive, and sensorimotor disorders (Akbarzadeh, Hoveyda, Ghalegir, and Mesrabadi, 2014). One cognitive function studied in children with ADHD is language. However, children with ADHD and normal children have not yet been directly compared in terms of dialogic (conversational) characteristics. Nowadays, communicating with others, especially peers, is increasingly considered to be the main problem of these children because peers think breaching the rules and aggressiveness commonly utilized by them as unpleasant and negative (XXX, Najarian, & Davoudi, 2010).

One variable affected by this childhood disorder is their social skills. An important aspect of human development is the process of socialization. The inherently collective life of human beings manifests the need to communicate with others as inescapable. According to XXX and XXX (1990; quoting Behpazhouh, 2005), social skills refer to a set of learned and acceptable behaviors that enable a person to communicate effectively with others and avoid irrational social reactions. Generally, social skills are described as the behaviors underlying successful and face-to-face communication. Social skills can also be defined as a set of abilities that initiate and maintain positive and beneficial social relationships, expand friendships and intimacy with peers, create a satisfactory school-based adaptation, and allow individuals to adapt to the condition and embrace the demands of the social environment (XXX et al., 2001). A part of the process of socialization of children is the acquisition of social skills. This process involves the formation of individual norms, skills, values,

attitudes, and behaviors, allowing the individual to play his or her current or future role in society appropriately (Khabiri, 2006).

Studies have also demonstrated that high levels of speech and language disorders in the population of children with ADHD are not only associated with major language delays in the use of syntax or meaning but also have a significant relationship with other communication disorders, especially expressive, functional, and speech disorders (Watson, 2003). XXX estimates that about 54% of children with ADHD have language problems. Other findings suggest that half of the children with ADHD under treatment experience mild to severe undiagnosed language disorders (Cohen, 1998).

Children with ADHD have significant communication disorders, slow performance in understanding and learning to speak, and difficulty reading and writing (Alizadeh, 2004). Children with ADHD are more prone to language disorders than normal children, including delays in using the first words and their combinations and poor performance on standardized tests (words, word combinations, reading fluency, and short-term memory). , And speech limitations, leading to several problems in continuous speech as well as improper speech participation and uses. Studies have shown that 35-50% of children with ADHD have high levels of language disorder, and more than 90% of them are referred to rehabilitation clinics (Redmond, 2004). These children may have receptive, intermediate, and expressive language problems. Most language theorists (including Bloom, 1974; Chapman, 1974; Ingram, 1974) have classified languages according to the systems of listening (receptive), organization (combinational-intermediate), and speaking (expressive), generally indicating how language is used and understood. More specifically, listening involves a decoding operation in which symbolic and abstract meaning is assigned to the heard speech. Speaking involves encoding operations during which meaningful speech is formulated and generated. Many linguistic activities involve the two systems.

Nevertheless, speaking seems to play a more significant role than listening in many tasks (assignments) and vice versa. However, since not all language tasks can be easily categorized into spoken or listened to, researchers interested in data processing models in the field of language development, such as Markman (1981) and Robinowitz and Glaser (1985), sought to expand language systems to add an organizing system to them. This system refers to the capacity of the brain to separate or organize the linguistic information entered by classification. Case (1978) proved that memory capacity (the ability to retrieve already-learned information) theoretically depends on organizational processing efficiency. The two basic organizational solutions are mediation and association, where one symbol is attached to another symbol, as hot and cold or parents are connected (XXX and XXX, quoted in Hassanzadeh & Minaei, 2010).

Given the high prevalence of ADHD and its socio-economic, cultural, familial, and individual harms, it is essential to emphasize social skills, especially language development problems, as factors influencing success, progress, health, and reduction of students' mental health problems, identification of aggravating factors, and prevention of its consequences. Language disorders of a significant percentage of children with ADHD remain undiscovered due to their irritating behaviors; Therefore, it is necessary to constantly review the language problems of children with ADHD. ADHD is a chronic and pervasive developmental disorder not limited to childhood (Kowsari and Alizadeh, 2010). Therefore, it is necessary to address the social problems of children with ADHD to determine which social skills they face the most difficulty in acquiring. Considering the inconsistent research findings, research gaps, some inconsistent studies, and limited and insufficient research studies in Iran, it seems that there are still hidden and undiscovered layers that should be discovered by conducting new research. Education should, as far as possible, accurately assess abilities and talents, as well as assess and diagnose abnormalities and various disorders with a variety of tools. ADHD is no exception. Few studies have extensively examined, described, and analyzed the language skills of Persian-speaking children with ADHD. The present study compares receptive, intermediate, and expressive language profiles in children with ADHD.

Research Method

This study uses a retrospective (causal-comparative) research design. The present study included two different statistical populations: 1) all girls aged 8-11 years with ADHD living in Tehran (n = 60) and 2) all normal children living in Tehran. Among them, 30 people, including normal children, were randomly selected as a sample (from different schools, one school was randomly selected, and 10 people were randomly selected from each school). Also, 30 children with ADHD were selected as a sample of study using a convenience sampling method and were divided into three groups of 10, including ADD, ADHD, and ADD.

Conners rating scale was used to ensure Children's ADD and hyperactivity group as well as non-disorder in normal children group. The results confirmed the presence of ADD in the group of hyperactive children and the absence of ADD in the group of normal children. Raven's test was also used to diagnose mental retardation (intellectual disability) in both hyperactive and normal children. The results showed a lack of mental retardation in both groups of children with ADD and normal children.

Research Tools

Assessment of language development receptive, intermediate, and expressive using TOLD (P3):

This study used the Test of Language Development (TOLD) (P3) (Newcomer and Hamill), adjusted and standardized by Hassanzadeh & Minaei (2009), to measure receptive, intermediate, and expressive language development. This test was first published in 1977 under the title TOLD. It then underwent a series of major changes in 1982 and was renamed TOLD-P: 2. In 1988, the manufacturers made several changes to it based on their experimental savings, as well as suggestions from TOLD-P: 2 users, leading to the formation of TOLD-P: 3 for children 4-0 to 11-8 years old. In 2001, Hassanzadeh & Minaei implemented TOLD TOLD-P: 3 on 1235 children, prepared normative tables based on the results, and finally published it in 2002. The test is based on a two-dimensional (2D) model, a dimension that houses linguistic systems accompanied by components of semantics, syntax, and phonology. The above 2D model forms the theoretical basis for preparing 9 subtests: 6 semantics/syntax subtests (among the main subtests) and 3 phonology subtests (among the supplementary subtests). The test is highly reliable, and the results can be used with confidence. It also serves as a valid language assessment test, which users can confidently use. In all subtests, a score of 1 is given to each correct answer, and a score of 0 is given to each incorrect answer. Each item must be answered exactly as specified in the test. Execution operation is stopped if the subject gives a wrong answer to 5 items in a row in the main subtests. In contrast, all items are executed in the three supplementary subtests (7-9) regardless of the child's response.

Hassanzadeh & Minaei has conducted comprehensive research on the standardization, reliability, and validity of TOLD, indicating its validity, reliability, and appropriate standardization, as well as its high correlation with other tests. Herein, the reliability coefficient was calculated to be 0.802 using Cronbach's alpha.

Raven's Progressive Matrices (RPM)

Standard Progressive Matrices (SPMs) are designed to measure an individual's ability to establish perceptual relationships and deductive reasoning independent of language and formal (school) education. The items in this test include 60 matrices or designs, each with a deleted part. The subject must find the deleted part from six or eight different options. Raven's Colored Progressive Matrices (CPM) test was developed by Raven (1947) in the United Kingdom, including 36 images (mostly colored), designed to test the IQ of children aged 5-11 and mentally retarded adults (XXX, translated by Baraheni, 2006).

The collected data were analyzed using MANOVA in SPSS 16 software to facilitate research data analysis.

Findings

The collected data were analyzed using Box's M test, with the results listed in Table 1.

Table 1: Box's M test results

Box's M	6.98
F	1.09
$d.f_1$	6
$d.f_2$	2437
sig	0.360

According to Table 2, the F-value is 1.09, which is significant concerning the significance level obtained with a 95% confidence interval (P<0.001). This indicates the homogeneity of variance-covariance matrices between cells formed based on between-subjects effects.

Table 2: Bartlett's Test of Sphericity

Likelihood ratio	0.0001
χ^2	49.6
DoF	5
Sig.	0.0001

According to Table 3, $\chi 2$ is 49.6, which is significant at a confidence interval of 99% (P<0.001), indicating a correlation between dependent variables (receptive, intermediate, and expressive language profiles).

Table 3: Multivariate test results

η2	Sig.	Error DoF	Assumed DoF	F	Value	Effect
0.437	0.0001	56	3	14.48	0.437	Pillai's trace
0.437	0.0001	56	3	14.48	0.563	Wilks Lambda

According to Table 4, Pillai's trace and F-value are 0.437 and 14.48, respectively, which are statistically significant at a confidence interval of 99%, indicating the effect of an independent variable on the linear composition of receptive, intermediate, and expressive language profiles, and consequently, the significance of multivariate tests. This confirms the difference between the two groups of independent variables in the dependent variables.

Also, according to the table above, η2 is 0.437, expressing R2 of the dependent variables of receptive, intermediate, and expressive language profiles concerning the groups of independent variables. That is, about 44% of the variance is explained by the difference between the two groups of independent variables in the interaction of the receptive, intermediate, and expressive language profiles.

Table 4: Test results of between-subjects effects

Sources of change	Dependent variables	Sum of squares (SS)	Degree of Freedom (DoF)	Average SS	F	Sig.	η2
Dependent variables	Receptive	264.6	1	264.6	20.26	0.0001	0.259
	Intermediate	476.2	1	476.2	23.12	0.0001	0.285
	Expressive	395.3	1	395.3	11.43	0.0001	0.165
Error	Receptive	757.3	58	13.1			
	Intermediate	1194.6	58	20.6			
	Expressive	2004.1	58	34.5			

According to Table 5, the F-value is 20.2 for the receptive dependent variable, which is statistically significant at a confidence interval of 99% (P<0.001), indicating the difference between the independent and receptive dependent variables. Also, η2 is 0.295 for the receptive dependent variable, indicating that the independent variable explains about 26% of the changes in the receptive dependent variable.

In addition, the F-value is 23.12 for the intermediate dependent variable, which is statistically significant at a confidence interval of 99% (P<0.001), indicating the difference between the independent variable and the intermediate dependent variable. Also, η2 is 0.285 for the intermediate dependent variable, indicating that the independent variable explains about 29% of the changes in the intermediate dependent variable.

In addition, the F-value is 11.43 for the expressive dependent variable, which is statistically significant at a confidence interval of 99% (P<0.001), indicating the difference between the independent variable and the expressive dependent variable. Also, η2 is 0.164 for the expressive dependent variable, indicating that the independent variable explains about 17% of the changes in the expressive dependent variable.

Conclusions

Multivariate analysis of variance (MANOVA) was used to examine whether there was a difference between receptive, intermediate, and expressive language profiles in children with ADHD and normal children. Also, a separate analysis of test results between-subjects effects was performed to examine each dependent variable. The results showed a significant difference between receptive, intermediate, and expressive language profiles in children with ADHD and normal children, at a confidence interval of 99%. This suggests a difference between receptive, intermediate, and expressive language profiles between children with ADHD and normal children.

In this regard, in their research on the language of children with ADHD, XXX et al. (2012) demonstrated that there is a difference between children with Asperger's syndrome and those with ADHD and normal children in terms of language (a significant difference was observed between children with ADHD and normal children). In addition, in his study, XXX (2012) showed significant differences between children with ADHD and normal children in terms of language skills. In another study, XXX et al. (2011) showed a significant difference between children with ADHD and normal children in terms of communication and language skills. In his study, Rezaeian (2010) argued that children with ADHD have poor performance or disability in chain abilities and that there is a

difference between them and the control group in spatial, verbal, and acquired-functional abilities.

The findings of this study are consistent with those of XXX et al. (2012), XXX (2012), XXX et al. (2011), XXX (1997), XXX et al. (Citing Kashani, 2002), XXX and Johnson (2011); quoting XXX and XXX, 2009), Rezaeian (2010), Alizadeh, Akbari, and Yadegari (2010).

The statistical sample is limited to all children aged 8-11 years with ADHD and all normal children living in Tehran, limiting the generalizability of the results. It is recommended to conduct a longitudinal study on the variations in language development in children with ADHD and normal children.

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Conflict of interest
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