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ORIGINAL ARTICLE

The Effectiveness of Teaching Symbolic Games on Theory of Mind and Facial Emotion Recognition in Children with Developmental Language Disorder

Susan Alizadeh Fard *[1], Nastaran Ghadernia [2]

1. Corresponding Author: Associate Professor, Department of Psychology, Payame Noor University, Tehran, Iran E.Mail: s.alizadeh@pnu.ac.ir
2. Master of Cognitive Psychology, Department of Psychology, Payame Noor University, Tehran, Iran

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Abstract

Aim: Developmental language disorder (DLD) is a neurodevelopmental condition that causes significant problems in understanding and using spoken language. The main research purpose was to examine the effectiveness of teaching symbolic games on theory of mind and emotion recognition in children with DLD. The statistical population included children with DLD aged 5-7 years in Mashhad, among which 30 were selected and randomly divided into experimental and control groups (n=15 per group). To collect data, theory of mind and children's facial emotion recognition tests were used. Their results were analyzed using MANCOVA. The findings revealed significant differences between the groups in facial emotion recognition ($p<0.01$) and theory of mind levels 1 and 2 ($p<0.05$). It can be concluded that this intervention has increased the recognition of facial emotions and theory of mind, and has generally improved social cognition abilities in children with DLD.

***Keywords**: Symbolic Games, Theory of Mind, Facial Emotion Recognition, Developmental Language Disorder*

Introduction

Developmental language disorder (DLD) is one of the most common neurodevelopmental disorders. Evidence shows that DLD is not only associated with language problems, but also general damage in other cognitive capacities, especially social skills (Lloyd-Esenkaya et al., 2020). Language facilitates the development of cognitive processes that are essential for social interactions (Jurik et al., 2023), i.e., social cognition. Social cognition processes thus allow people to understand, interpret and process information related to the environment and social relations. Two important components of social cognition include theory of mind and emotion recognition (Bitaneh et al., 2022). Research evidence shows that children with DLD have problems in everyday social interactions that involve the use of theory of mind (Schwartz Offek and Segal, 2022). It seems that the development of language skills is necessary for the development of theory of mind in children with DLD (Durrleman et al., 2019). Also, it has been found that children with DLD have problems in recognizing emotions (Taylor et al., 2015) and make more mistakes in identifying simple and complex emotions (Tsou et al., 2023). Recently, it has been suggested that DLD occurs due to defects in cognitive representations (Ahadi, 2018). In the second year of life, two important cognitive processes are formed in parallel: Language and symbolic play (Makarem et al., 2021). Studies show that the delay or weakness of symbolic play is among the most important symptoms of children with all sorts of language problems (Chang and Sun, 2023). So far, many game-based interventions have been designed to promote the social and emotional development of children, especially those with autism, but symbolic games for children with DLD have been less emphasized (Francis

et al., 2022). Considering this research gap, the present study investigates the effectiveness of teaching symbolic games on theory of mind and emotion recognition in children with DLD.

Methodology

The current research was semi-experimental, with a pretest-posttest design and a control group. The statistical population included children with DLD referred to private speech therapy centers in Mashhad, Iran, in the first six months of 2012. Convenience purposive sampling was used to select 30 children based on the eligibility criteria. The inclusion criteria were: The child (and their family) being monolingual Persian speakers, age 5-7 years, diagnosis of DLD by a speech and language pathologist, normal non-verbal intelligence based on the Wechsler children intelligence test, structural and functional health of the speech organs in their examination for natural speech production, and the child's guardian signing a consent form. The exclusion criteria were: Vision and hearing impairment, history of neurological disorders such as seizures and developmental disorders and other psychological disorders based on the child's history, or absence from more than two sessions of the intervention. The children were randomly divided into experimental and control groups of 15. The tools used for data collection included the Theory of Mind Test, developed by Muris et al. (1999) to assess children's social understanding, sensitivity and insight on three levels. This test has been modified for Iranian children with 38 items and with the names changed to Persian names. The psychometric assessment of this form of the test has revealed adequate validity and reliability (Dehghan et al., 2015).

Another tool used was children's facial emotion recognition test, a computer-based task displaying 24 faces (girls and boys of different races) with six main emotional states (surprise, happiness, sadness, fear, disgust, and anger) and four images presented for each emotion. The images were taken from the Child Affective Facial Expression (CAFÉ) set. The sensitivity of the test was checked and its effect size for six emotions was above 0.14 (range: 0.24-0.91), which is acceptable.

First, the pretests were administered in both groups. Then, the experimental group received training on symbolic games over ten 50-min sessions (three times per week) for about one month. The control group did not receive any interventions during this time and was kept on a waiting list. At the end of the training period, both groups took the posttests, and the results were compared in SPSS-21 using MANCOVA.

Results

The mean age was 5.75 (±0.60) years in the experimental group and 5.72 (±0.48) in the controls, showing no significant differences (t=0.136 and sig=0.42). As shown in Table 1, there was no significant difference between the scores of the two groups at pretest, but at posttest, the scores increased in the experimental group.

Table 1. Descriptive data on the pretest and posttest scores in the control and experimental groups

		Experimental group		Control group		Differences in pretest	
		Mean	**Std. Deviation**	**Mean**	**Std. Deviation**	**t**	**sig**
Theory of mind 1	Pretest	12.33	3.55	11.06	2.40	1.14	0.26
	Posttest	14.73	3.23	11.40	2.32		
Theory mind 2	Pretest	3.53	2.44	4.60	1.63	1.40	0.17
	Posttest	5.73	1.83	4.93	1.66		
Theory of mind 3	Pretest	0.53	1.24	0.73	0.88	0.50	0.61
	Posttest	1.26	1.22	0.93	0.79		
Emotion recognition	Pretest	18.40	1.95	17.80	3.14	0.62	0.53
	Posttest	20.20	1.82	17.60	2.94		

Next, the multivariate covariance analysis (MANCOVA) was performed, as shown in Tables 2 and 3. Table 2 reveals a significant difference between the experimental and control groups in at least one of the variables.

Also, Table 3 shows that there is a significant difference between the experimental and control groups in all the variables, except for theory of mind level 3.

In other words, at posttest, there is a significant difference between the two groups in all the research variables (except theory of mind level 3), and teaching symbolic games leads to a significant increase in the recognition of facial emotions and theory of mind levels 1 and 2 among children with DLD.

Table 2. Summary of the covariance analysis of the effect of teaching symbolic games on the research variables

	Value	F	Hypothesis df	Error df	Sig.
Pillai's Trace	0.993	92.700	11.000	7.000	0.0001
Wilks' Lambda	0.007	92.700	11.000	7.000	0.0001
Hotelling's Trace	145.672	92.700	11.000	7.000	0.0001
Roy's Largest Root	145.672	92.700	11.000	7.000	0.0001

Table 3. Results of the univariate covariance analysis of the effect of teaching symbolic games on each independent variable

Dependent variable	Sum of squares	df	Mean Square	F	Sig.
Theory of mind 1	15.088	1	15.088	5.58	0.030
Theory mind 2	6.18	1	6.18	4.57	0.047
Theory of mind 3	0.52	1	0.52	2.05	0.17
Emotion recognition	13.07	1	13.07	8.54	0.009

Discussion and conclusion

In general, this research was conducted in line with previous studies to teach symbolic games to children with DLD. The results showed positive effects with respect to two main problems: Theory of mind and recognition of facial emotions. It can be concluded that symbolic games are directly linked to the development of social cognition skills. The implementation of this intervention was very attractive for the children. According to the parents' reports, the verbal output, the number of times and the time of their spontaneous communication, verbally and non-verbally, in the environment outside the training sessions also showed a very favorable progress.

The present research was faced with some limitations, mainly the failure to take account of the effect of variables such as gender, family's socio-economic status, parents' education, and environmental differences (stimulation richness). Therefore, it is suggested that the effect of these variables be considered and investigated in future studies. Choosing to examine the effect of variables such as bilingualism or developmental disorders such as autism can also be very interesting and valuable. Finally, considering the positive results of teaching symbolic games, it is recommended that therapists and teachers use this method for children with DLD in treatment and educational settings.

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