

Dohsa training and Theory of Mind in High Functioning Autistic Children

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Objectives: The theory of mind hypothesis states that children with autism are impaired in the development of the ability to appreciate their own and other people's mental states. The people with Autism Spectrum Disorder needs treatment approach which to strengthen their movement, focus of attention, eye contact and relaxation. "Dohsa-hou" is a Japanese psycho-rehabilitation method by motor training, that many of researches investigated its effectiveness on many aspects of autism spectrum disorders. The purpose of this study was to evaluate the effect of Dohsa training on theory of mind in high-functioning autistic children.

Methods: In a quasi-experimental study with pre-test, post-test designs without control group, 6 children with Autistic Spectrum Disorder participated in the study. Pre-test was administered for all participants by theory of mind questionnaire. Participants were given Dohsa training for a period of 4 weeks, 3 sessions of one hour a week. At the end of training, the post test was done by the same questionnaire. In the study, two tools for measuring the effect were used; Autism Spectrum Screening Questionnaire and Theory of mind Questionnaire.

Results: The results showed that there were significant differences between the subjects participated in treatment before and after the intervention, and indicated that in the subjects after the 2 weeks of enforcement of treatment and one month after performing the post-test there was no significant difference.

Discussion: As data showed, Dohsa training was an effective treatment for autistic children and movement has very important role in cognition, learning and cognition performance, especially theory of mind because movement and rhythm stimulate the brain. Together these findings suggest that it may be the autistic children motivation to move in ways they have not tried before that led their improvement during this psycho-rehabilitative program which affect their cognition and theory of mind.

Key words: theory of mind, Dohsa-hou, high functioning autistic children

Submitted: 17 February 2014

Accepted: 27 March 2014

Introduction

Theory of mind (TOM) is the process that enables a person to assess what another person is thinking or feeling and to follow others' intentions. Theory of mind is a core topic in both social neuroscience and developmental psychology, yet theory and data from each field have only minimally constrained thinking in the other. It is believed that a part lack of TOM is one symptom of autism and there are now support

programs showing mild success attempting to teach the rules of TOM to autistic individuals. The two fields might be fruitfully integrated such is the current state of TOM research, where there is a little overlap in how developmental psychologist and social neuroscientists study the ways in which people impute mental states to self and other (1). Social neuroscience and developmental psychology both prominently feature research on TOM, yet

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emphasize different facets of this core social cognitive ability (2).

Physical exercise has positive effects on cognitive functioning in both healthy person and people with mental disorder (3). From Piaget period, it would underline the importance of motor patterns in the development of concept formation during the sensory motor period (4), and also in recent studies "movement" Plays an important role in cognitive functioning (1). Although recent researches has shown that physical activity may be able to lead that healthy and physically active older adults show significantly better cognitive function and less cognitive decline (3, 5, 7); but yet the role of movement in mental development, according to the literature would appear to stop after early childhood, Therefore, it is essential to study the effects of physical activity on cognition in children, especially children with special needs such as autistic children. Symptoms of Autism Spectrum Disorder represent a single continuum of mild to severe impairments in the two domains of social communication and restrictive repetitive behaviors /interests rather than being distinct disorders. High-functioning autistic children are the most requiring support (8). One of the main problems in autistic disorders is the deficits in cognition and deficits in theory of mind (1). The people with Autism Spectrum Disorder needs treatment approach which to strengthen their movement, focus of attention, eye contact and relaxation. These treatments could be effective in improving their cognition, especially their theory of mind. One of these methods is Dohsa-hou Psycho-Rehabilitation.

"Dohsa-hou" is a Japanese psycho-rehabilitation method by motor training, that many of researches investigated its effectiveness on many aspects of autism spectrum disorders (9-13). 'Dohsa' means a holistic process of motor action which consists of the inner psychic activities of a body movement and 'Hou' means method. When we intend to move some parts of our body, we strive to carry out an intended movement. If the striving is appropriate to the movement, the intended movement can be carried out (14). The method of *Dohsa-hou* is based upon such a concept. Suitability of *Dohsa hou* method was examined in different researches. The method has been practiced on different kinds of disability and the efficacy of it has been established in general. However no research was conducted to isolate the components of motor activities and its effect on cognition and theory of mind. The present

research aims at investigating the effect of Dohsa on cognitive dimensions of body movement of high functioning autistic children.

Methods

In a quasi-experimental study with pre-test, post-test designs without control group, 6 children with Autistic Spectrum Disorder from "Autistic Beh-ara Center" in Tehran were selected randomly. These children were recognized as high-functioning autistic children by psychiatric diagnosis. Pre-test was administered for all participants by theory of mind questionnaire. Participants were given *Dohsa* training for a period of 4 weeks, 3 sessions of one hour a week. At the end of training, the post test was done by the same questionnaire. In the study, two tools for measuring the effect were used.

Autism Spectrum Screening Questionnaire. The Autism Spectrum Screening Questionnaire (ASSQ) has been standard by Kase-Chi (15); he normed the questionnaire for children with autism, high functioning in Iranian population. The questionnaire contained 42 items which to be answered on a 5-point likert type scale (0-4), ranking from "Not having" to "Severe". Symptoms are assigned to three subscales which represent domains of psychopathology: Problems in the areas of social interaction, problems with speech and language delay in children, and behavioral problems and unusual symbolic Games (15).

Theory of mind Questionnaire. The theory of mind Questionnaire designed to give information on the range of social understanding, sensitivity and insight of the child, as well as the degree to which he/she is able to accept the thoughts and feelings of others (16). In Persian version, the number of questions has been reduced to 38 and the validity of the test was 0.89 estimated that in one hundredth level was significant (17). Subtests correlation with the total test score was also significant from 0.82 to 0.96. Testing internal consistency using Cronbach's alpha for the total score and subtests, respectively, 0.86, 0.72, 0.80, 0.81 has been calculated. Coefficient Credit scoring 0.98 was obtained. This questionnaire has three subscales: 1) Preliminary theory of mind which pretends emotion recognition and consisting of 20 questions, 2) First manifestation of real theory of mind which manifest the mistaken primary belief and includes 13 items, 3) More advanced aspects of theory of mind that means understanding secondary mistaken belief or understand a joke and consisting of 5 items. From total the three subscale scores for a theory of mind,

one score is achieved. This is much higher scores indicating higher levels of children's theory of mind achievement. The total run time for the test was between 15 to 20 minutes. The correct answer score was "1" and incorrect answers was "0". The first subscale score was between "0 to 20", second score was between "0 to 13", the third score was between "0 to 5", and the total test score was between "0 to 38".

Results

Distribution of demographic variables are indicated in table (1), all participants were boy, 3 of them are studying in grade 2, one in grade 1, and the other 2 are in grade 3. Their age was between 7 and 10. The total score of ASSQ was between 53 and 79. The highest score was reported from Case 3, and the lowest score was owned by Case 4.

Table 1. Demographic variables based on age, grade and ASSQ score

	Age	Grade	Score of ASSQ			total score
			Problems in the areas of social interaction	Problems with speech & language delay	Behavioral problems & unusual symbolic Games	
Case 1	8	2	10	22	30	62
Case 2	8	2	11	25	38	74
Case 3	7	1	13	27	39	79
Case 4	10	3	10	17	26	53
Case 5	9	3	12	20	28	60
Case 6	8	2	15	20	30	75

The result of pre-test - post-test and follow up scores of children with autism disorder on theory of mind

tests in subtests and total score is shown in table (2).

Table 2. Pre-test, post-test and follow up test scores on tests of theory of mind to separate subtests

	first subtest	second subtest	third subtest	total score
Case 1				
Pre-test	16	2	0	18
Post-test	16	4	0	20
Follow up test	16	3	0	19
Case 2				
Pre-test	13	2	0	15
Post-test	14	3	0	17
Follow up test	14	3	0	17
Case 3				
Pre-test	14	1	0	15
Post-test	16	1	0	17
Follow up test	15	1	0	16
Case 4				
Pre-test	17	2	0	19
Post-test	19	3	0	22
Follow up test	19	3	0	22
Case 5				
Pre-test	15	8	0	23
Post-test	17	9	0	26
Follow up test	16	8	0	24
Case 6				
Pre-test	16	2	0	18
Post-test	18	3	0	21
Follow up test	19	3	0	22

To examine the effect of *Dohsa-hou* on theory of mind, the mean rating of theory of mind scores

before and after the intervention is indicated in table (3).

Table 3. Mean ratings of the scores before and after intervention

	M	SD	Std	T	df	sig
pre-test	18	2.966	1.211			
post-test	20.5	3.391	1.384			
pretest - posttest	19.25	0.5477	0.2236	11.18	5	0.01

To examine the effect of *Dohsa-hou* on theory of mind the and continuity of treatment effect, the mean score of pre-post and follow up scores are shown in table (4).

Table 4. Mean ratings of the scores of pre-post intervention and follow up

	M	SD	Std Error Mean	T	df	sig
post-test	20.5	3.391	1.384			
Follow up test	20.33	3.723	1.520			
post-test - Follow up test	20.41	0.7527	0.3073	0.542	5	0.611

The results showed that there were significant differences between the subjects participated in treatment before and after the intervention ($t=11.18$, $p<0.01$), and also result indicated that in the subjects after the 2 weeks of enforcement of treatment and one month after performing the post-test there was no significant difference ($t=0.542$, $p>0.01$). It can be conclude that the *Dohsa-hou* training on theory of mind in high-functioning autistic children was affective, also this effect seems to have persisted for a month, and the therapeutic effect was maintained.

Discussion

The goals of this research were: examine the effectiveness of *Dohsa-hou* on theory of mind in high-functioning autistic children. As data showed, *Dohsa-hou* was effective treatment for autistic children. Now the question is how does movement "participate" in cognition? One possible explanation could be the role of the cerebellum in cognitive and motor simultaneously (1). The general consensus no longer concerns whether or not the cerebellum plays a role in cognition, but instead, concerns how the cerebellum contributes to both movement and thought. The cerebellum relies upon analogous mechanisms to support both skilled motor and cognitive operations and cognitive dimensions of body movement or the movement aspects of cognition (18). Therefore the cerebellum's role in motor function is well recognized; also the nature of its concurrent role in cognitive function has been confirmed. The current consensus paper gathers diverse views on a variety of important roles played by the cerebellum across a range of cognitive and emotional functions. Although movement serves as a

primary medium for young children's learning, the motor, cognitive, emotional and social developmental domains are interrelated.

Social-cognitive neuroscience research has contributed importantly to our understanding of the neural systems that support TOM (19). Results discussed is supported by some neural evidence, yet each is also called into question by other evidence or left open to question in the absence of sufficient evidence (18). There are some studies which support our finding (20, 21, 22), all these researches have pointed out that physical activity on cognition and cognition performance is affective and how it can have positive effects on cognitive function of multiple categories like Solomon, people with or without a mental disorder. Movement serves as a primary medium for young children's learning, the motor, cognitive, emotional and social developmental domains are interrelated (23)

Conclusion

Movement has very important role in cognition, learning and cognition performance, especially theory of mind because movement and rhythm stimulate the brain (frontal lobes) and enrich language and motor development, contributes to the enhancement of a positive self-image, self-confidence, creativity, and self-expression, stimulates the learning process and promotes physical fitness and development of the child. Children learn experientially through play, experimentation, exploration and discovery. The brain actually changes as a result of experience. In order to function children's brains optimally, they must have experiences that produce and strengthen brain connections (24, 25, 26).

Considering the importance of early detection and prevention of diseases to reduce costs especially for children with special needs that may lead to severe psychological disorders, it seems that by developing preventive programs, treatment, rehabilitation programs we can improve some areas of cognition dysfunction, and reduce irreversible impacts on children, their families and the community. Together these findings suggest that it may be the autistic children motivation to move in ways they have not

tried before that led their improvement during this psycho-rehabilitative program which affect their cognition and theory of mind. Future studies are needed to further evaluate these findings.

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Acknowledgment

This research has been implemented in the "Beh-ara center for the treatment of autistic Disorder, we sincerely appreciate the Beh-ara cooperation and thank the children that participated in this study.