

# Potentials of speech disorders correction in 4-6 yrs children by means of ergo and art therapy

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## Abstract

**Purpose:** to work out methodic of speech disorders correction in 4-6 yrs children by ergo and art therapy means.

**Material:** during academic year three groups of children (n=97) were being observed: two groups – with speech disorders (control and main) and one group of healthy children. Psycho-motor and cognitive functions were assessed with the help of tests for motor coordination (speed of their fulfillment, verbal thinking).

**Results:** it was found that characteristic feature of such children is critical estimation of own speech insufficiency and conscious avoiding oral answers. By cluster analysis results increase of homogeneity in psycho-physical condition's positive changes, cognitive functions and dance abilities resulted from dance-correction training program were shown.

**Conclusions:** the worked out dance-correction choreographic trainings helps in the following: developing rhythm sense; strengthening of skeleton and muscles; memory, attention, thinking and imagination simulation. Acquiring of such experience will help a child to further successfully train different art-creative and sports kinds of activities; to master choreography and gymnastic as well as different musical instruments.

**Keywords:** preschool children, speech disorders, psycho-motor qualities, cognitive functions, therapy.

## Introduction

It is known that human speech is one of the most important components of psychic functions for children. It is a basis of consciousness and social adaptation formation. In the age from 4 to 6 years a child accumulates certain motor skills, that creates a foundation for targeted pedagogic influences [7, 28]. Since long ago it has been known, what great potentials are in synthesis of music and movements. Besides, influence of different cognitive and emotional-moral educational means was found: reading [1, 3, 4]; folk tales [4, 12]; music and dances [6, 22]; amateur theatre performances [17]; sports practicing and computer technologies [26]. Musical rhythmic movements are a synthetic kind of activity; they are of special importance for children. Such motor exercises train brain and nervous processes mobility [6, 21, 30]. With it organization of motor functioning with the help of musical rhythm develops children's memory, attention and self-concentration. It facilitates formation of targeted functioning [2, 9, 13, 19].

Especially important and relevant is the problem of children's with speech disorders education. It touches the questions of child's pedagogic and psycho-physical development. It is known that speech defects hinder from cognitive functioning, form neurological disorders, isolation and alienation; restrict communication with peers. [3, 9, 14, 18]. After entering preschool establishments, such children are enlisted in general group. It should be noted that children with speech disorders often suffer from deficit of fine motor skills [23-25, 29]. In other work art-therapy positive influence on adaptation of schoolchildren, living in stress conditions, was determined [16]. Some other authors offer a number of game therapy measures, which can facilitate strengthening of emotional links in families with children of 4-6 yrs age [32]. Game therapy influences on children's progress to the largest extent. It

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is especially important for 5-6 yrs children who live in societies with low economical level [15]. In other study potentials of complex game and work therapy are shown [20]. In all such cases parents play the most important role [27].

All above said permits to assume that for children with speech disorders dance-cognitive choreographic trainings with sport dances elements, role game exercises with objects, dance gymnastic, musical games, breathing exercises, creative gymnastic and so on can serve as promising rehabilitation means. The mentioned above practices ensure training of memory, attention, self-concentration, formation of creativity [2, 9, 19, 28].

*The purpose of the research* was to work out methodic of speech disorders correction in 4-6 yrs children by ergo and art therapy means.

## Material and methods

**Participants:** three groups of children (n=97) were being observed: two groups – with speech disorders (control and main) and one group of healthy children. Control group and group of healthy children were trained by program "Children's choreography", recommended by Ministry of education and science of Ukraine [12]. In main group we conducted trainings with complex of ergo and art therapy means. The word "ergo-therapy" derives from Latin "ergon" – work. Art therapy implies treatment with art means.

**Organization of the research:** psycho-motor and cognitive functions were assessed with the help of tests for motor coordination (speed of their fulfillment, verbal thinking) (methodic of Ya. Yerasyk) [7]; rhythm-motor abilities [6, 22]. Assessment in points was realized in the following way: high level – 9-10 points; above average – 7-8, average – 5-6, below average – 3-4 and low level – 1-2 points [6].

Assessment of speech was carried out in compliance

with legal standards and diagnostic criteria of main speech disorders, presented in “Professional reference book of pre-school educational establishment teacher – logopedist” (№ 1/11-4593 dt. 28.02.13). The following speech components were assessed; grammar (word changing, when counting objects); sounds’ pronunciation (repeating of sentences); phonematic (listening in and finding object in picture); lexis (name of each picture and reasonable generalization of all pictures); syllable structure of words (correct syllables’ pronunciation in words). Assessment was fulfilled with 10-points scale.

The research was conducted in specialized pre-school educational establishments of Kiev: № 61, 110, 653. Moral ethic standards were observed in compliance with Helsinki declaration (2013). Parents gave written consent for pedagogic observations over physical condition and cognitive progress of their children.

*Organization and content of dance-choreographic trainings:* we worked out choreographic trainings program for one academic year (trainings twice a week, 25-30 minutes each). The trainings stipulated exercises with objects (flags, balls, gymnastic sticks and etc.), sport dances, fit-ball dance gymnastic, role tale-therapy, logo-rhythmic, game fitness, breathing exercises. Before trainings we regularly familiarized children with required elements of musical and choreographic knowledge, dance figures, children fitness and movements with singing.

Choreographic trainings were constructed by the following structure:

- 1<sup>st</sup> part – introductory (4-5) minutes: exercises, influencing on all organism;
- 2<sup>nd</sup> – main (10–12 min.): exercises for arms and legs positions. Rhythmic part was conducted in quick, dynamic temp. We used exercises for backbone plasticity, strengthening of back and abdomen muscles as well as legs muscles;
- 3<sup>rd</sup> – final (8–10 min.): choreographic compositions based on earlier mastered and relaxation exercises.

In all parts of training we applied games and exercises

oriented on speech correction: formation of quickness and accuracy of reaction to sound or verbal signals; mastering of different qualities of attention, all kinds of memory, verbal regulation of actions, based on concordance of words and movements; development of ability to realized planed actions by prearranged signal. Depending on mastering of separate elements we complicated: 1) exercises and figures; 2) added concordance of words and movements; 3) realized of planned actions by prearranged signal; 4) improved visual orientation in space; 5) concentrated on expressiveness of image; 6) created situations for mutual actions and creative tasks.

*Statistical analysis:* was fulfilled with the help of “STATISTICA 10.0” programs [8, 31]. Cluster analysis was fulfilled for determination of the tested groups’ homogeneity. On its base we classified the tested objects and variables in the form of tree (dendrogram) and distributed objects into pre-set quantity of distant from each other classes.

### Results

On initial stage of the research we carried out comparative characteristic of children’s physical condition and cognitive functions. 21% of girls and 20% of boys showed results, corresponding to standards. 27% of girls and 32% of boys could not reach standards (see table 1).

Besides, we found that cognitive functions indicators in children with speech disorders were high in 29% of the tested (19% – boys and 10% – girls); above average – in 19% (9% and 10% accordingly), average – in 13% (7% and 6%), below average – in 20% (10% and 10%) and low level – in 19% (9% and 10%). We also found that children with speech disorders lag behind from healthy children by physical condition and verbal thinking.

Pedagogic observations showed that children with speech disorders differed from healthy peers by some emotional reactions. For sick children critical assessment of their speech insufficiency was characteristic. In this connection such children tried to consciously avoid oral

**Table 1.** Psycho-physical characteristics of 4-6 yrs children

Sex	n	Age	Quickness		Accuracy		Endurance	
			Walk (sec.)	“Lie – stand up” (sec.)	Throws (quantity)	Walk by “checkers” (quantity)	“Lie – stand up” (quantity)	Dynamic (quantity)
Children with speech disorders								
Boys	19	4–5	12,36±0,61	4,20±0,02	1,1±0,01	1,94±0,009	1,89±0,01	11,05±0,51
Boys	29	5–6	11,11±0,57	6,72±0,021	2,44±0,012	2,27±0,013	2,41±0,011	23,44±0,82
Girls	21	4–5	13,47±0,42	5,23±0,02	1,28±0,011	2,0±0,011	0,8±0,003	17,14±0,61
Girls	20	5–6	10,72±0,46	7,2±0,022	2,9±0,012	2,35±0,013	2,45±0,001	26,5±0,78
Healthy children								
Boys	5	4–5	38,2±2,1	15,3±0,12	2,0±0,11	15,6±0,78	1,6±0,02	31,8±2,0
Boys	10	5–6	51,1±2,4	21,3±0,27	2,0±0,09	6,73±0,24	1,0±0,01	89,5±3,4
Girls	5	4–5	34,0±1,75	9,1±0,36	0,7±0,01	5,7±0,43	0,8±0,008	33,6±2,0
Girls	10	5–6	52,9±3,1	29,7±0,41	2,8±0,08	12,8±0,61	1,0±0,01	68,0±2,9

Note: n – quantity

**Table 2.** Psycho-motor progress of 4-5 yrs healthy children and children with speech disorders

Indicators	Maun group (n=12)				Control group (n=18)				Healthy children (n=13)			
	Beginning of academic year		End of academic year		Beginning of academic year		End of academic year		Beginning of academic year		End of academic year	
	$\bar{x}$	$\pm m$	$\bar{x}$	$\pm m$	$\bar{x}$	$\pm m$	$\bar{x}$	$\pm m$	$\bar{x}$	$\pm m$	$\bar{x}$	$\pm m$
Walk by checkers	5,92*	0,54	7,25*	0,56	4,67*	0,39	5,56*	0,35	8,23	0,34	8,31	0,32
Lie- stand up	6,25*	0,5	7,08*	0,52	5,06*	0,33	5,5*	0,37	8,23	0,34	8,31	0,36
Accuracy of ball throws	6,0*	0,41	7,08*	0,45	4,17*	0,41	5,06*	0,44	7,85	0,41	8,15	0,35
Jumps on one and two legs	6,17*	0,54	7,33*	0,57	4,56*	0,38	5,28*	0,41	8,08	0,4	8,31	0,3
Keeping arms with closed eyes	6,0*	0,51	6,92*	0,64	4,78	0,4	5,0	0,46	8,08	0,36	8,08	0,32
Test 1: Keeping arms with closed eyes	5,83*	0,53	6,83*	0,64	4,33*	0,41	4,78*	0,47	8,08	0,36	8,15	0,31
Test 2: touching nose	5,83	0,5	6,83*	0,64	4,39*	0,42	4,89*	0,53	7,46*	0,42	8,15*	0,39
Test 3: jumping	6,17*	0,48	7,08*	0,47	4,83*	0,36	5,33*	0,42	8,08	0,36	8,08	0,32
Test 4: picking coins up in box	6,25*	0,56	7,33*	0,49	5,17*	0,28	5,72*	0,29	8,23	0,38	8,38	0,34
Test 5: drawing circles in the air	6,08*	0,52	7,08*	0,52	5,0*	0,36	5,44*	0,39	8,38	0,32	8,46	0,19
Test 6: hand shaking	6,0*	0,48	7,0*	0,53	4,56*	0,37	5,39*	0,43	8,54	0,25	8,54	0,19

Notes: \* -  $p < 0,05$  confident differences after dance-correction program

answers, though they demonstrated sufficient interest and intelligence when fulfilling tasks.

The fulfilled comparison of children's psycho-physical condition changes under influence of dance-correction program showed that in 4-5 yrs children and in 5-6 yrs children (see table 3) motor actions quickness (walk by checkers, lie- stand up) and endurance (jumps on one and two legs) confidently grew. In control group the progress was less.

The received data about psycho-physical qualities, psycho-motor fitness, cognitive functions and dance abilities were used for determination of children group's homogeneity changes (14 persons). By these characteristics we fulfilled cluster analysis. It showed that at the beginning of academic year 50% of children had values of average level and above average, 42% – below average and average, 8% – below average. The analysis showed that at the end of academic year 71% of children had indicators at average and above average level, 21% – average and below average and 8% – below average (see fig. 1).

Results of this part of the research showed that cluster analysis can be used as the method of choreographic classes' effectiveness. It permits to determine homogeneity

of psycho-physical condition, cognitive functions and dance abilities.

We also assessed correction of speech disorders (see table 4). It was found that in 4-5 yrs children speech grammar component increased by 18%, pronunciation of sounds – by 14%, phonetic – by 16%, vocabulary – by 11%, syllable structure of words – by 8% by the end of academic year. In control group positive changes also took place but they were 2-3 times weaker (accordingly: 9%, 8,5%, 1,5%, 4,5%, 4,5%). Healthy children had high level of speech both at the beginning and at the end of academic year.

In 5-6 yrs children of main group positive changes in speech functions turned out to be even more significant than in 4-5 yrs children (17, 2%, 16,6%, 21,9%, 19%, 17%). It can be explained by the fact that older children's attitude to choreography was more responsible.

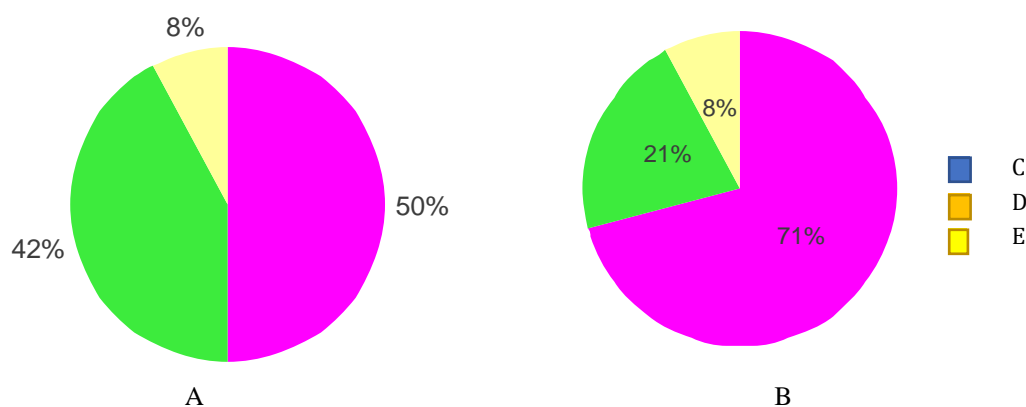
Besides, some positive changes in speech were also registered. At the beginning of academic year it was difficult for children to speak in public. At the end of academic year children were capable to independently realize graduation concert, in which they participated as comperes, song, danced and read poems.

Thus, in 4-6 yrs children with speech disorders we

**Table 3.** Psycho-motor progress of 5-6 yrs healthy children and children with speech disorders

Indicators	Main group (n=14)				Control group (n=16)				Healthy children (n=24)			
	Beginning of academic year		End of academic year		Beginning of academic year		End of academic year		Beginning of academic year		End of academic year	
	$\bar{x}$	$\pm m$	$\bar{x}$	$\pm m$	$\bar{x}$	$\pm m$	$\bar{x}$	$\pm m$	$\bar{x}$	$\pm m$	$\bar{x}$	$\pm m$
Walk by checkers	7,1	0,41	7,4	0,3	6,69	0,45	6,75	0,47	8,21	0,29	8,25	0,31
Lie- stand up	6,9	0,44	7,6	0,14	7,0	0,33	7,25	0,36	8,17	0,3	8,42	0,25
Accuracy of ball throws	5,4*	0,49	6,7*	0,41	6,63	0,46	6,69	0,44	7,42	0,35	7,88	0,28
Jumps on one and two legs	6,6*	0,42	7,6*	0,18	7,31	0,32	7,31	0,34	8,21	0,28	8,33	0,25
Keeping arms with closed eyes	5,8*	0,67	7,1*	0,43	6,75	0,36	7,06	0,39	7,67	0,35	8,04	0,27
Test 1: Keeping arms with closed eyes	6,4	0,55	6,9	0,47	6,88	0,35	7,06	0,37	7,42	0,36	7,63	0,3
Test 2: touching nose	5,6*	0,55	6,8*	0,45	6,56	0,48	6,88	0,44	7,17	0,38	7,33	0,36
Test 3: jumping	6,9	0,37	7,3	0,3	6,75	0,44	6,75	0,46	8,33	0,24	8,42	0,22
Test 4: picking coins up in box	6,9	0,43	7,6	0,14	7,25	0,27	7,38	0,26	7,88	0,3	8,17	0,26
Test 5: drawing circles in the air	6,8	0,39	7,4	0,21	6,69	0,49	6,81	0,41	8,33	0,24	8,38	0,24
Test 6: hand shaking	6,1*	0,4	6,9*	0,4	6,38	0,5	6,44	0,44	8,33	0,24	8,38	0,24

Notes: \* - p < 0,05 confident differences after dance-correction program



**Fig.1.** Change of children’s distribution by homogeneity of the analyzed characteristics (by cluster analysis). A – at the beginning of academic year; B – at the end of academic year; C – average values and above average; D – average values and below average; E – values below average.

registered positive speech changes and favorable psycho-physical progress under influence of the worked out dance-correction program.

**Discussion**

The received results proved relevance of non traditional means and methods application for children’s

musical and aesthetic education. Such approach permits to fill educational process with positive emotions. It enriches to large extent emotional and intellectual progress of a child [3, 9, 17, 30]. Formation of character, cultivation of initiative, and will, manifestation of natural bents are an important factor of children’s somatic health and physical growth [1, 2, 3, 9].

**Table 4.** Speech diagnostic of 4-6 yrs children with speech disorders and healthy

Speech parameters	Main group 4–5 yrs				Control group 4–5 yrs				Healthy children 4–5 yrs			
	Beginning of academic year		End of academic year		Beginning of academic year		End of academic year		Beginning of academic year		End of academic year	
	$\bar{x}$	$\pm m$	$\bar{x}$	$\pm m$	$\bar{x}$	$\pm m$	$\bar{x}$	$\pm m$	$\bar{x}$	$\pm m$	$\bar{x}$	$\pm m$
Grammar	5,5*	0,66	6,58*	0,71	3,94*	0,42	4,33*	0,47	8,54	0,22	8,85	0,28
Pronunciation	5,58*	0,75	6,50*	0,71	4,06	0,40	4,28	0,45	9,38	0,15	9,38	0,15
Phonetic	5,92*	0,64	7,08*	0,69	4,61	0,46	4,67	0,46	9,15	0,23	9,15	0,23
Vocabulary	6,17*	0,69	6,92*	0,64	4,83	0,47	5,06	0,51	8,62	0,38	8,62	0,38
Syllable structure of words	6,67*	0,82	7,25*	0,76	4,61	0,46	4,83	0,49	9,00	0,26	9,00	0,26

Speech parameters	Main group 5-6 yrs				Control group 5-6 yrs				Healthy children 5-6 yrs			
	Beginning of academic year		End of academic year		Beginning of academic year		End of academic year		Beginning of academic year		End of academic year	
	$\bar{x}$	$\pm m$	$\bar{x}$	$\pm m$	$\bar{x}$	$\pm m$	$\bar{x}$	$\pm m$	$\bar{x}$	$\pm m$	$\bar{x}$	$\pm m$
Grammar	6,21*	0,65	7,50*	0,68	5,63	0,34	5,94	0,42	9,08	0,21	9,33	0,17
Pronunciation	6,14*	0,71	7,36*	0,71	5,00*	0,35	5,50*	0,46	9,29	0,18	9,42	0,15
Phonetic	6,14*	0,56	7,86*	0,70	4,63	0,36	4,94	0,39	9,63	0,10	9,63	0,10
Vocabulary	6,36*	0,55	7,93*	0,65	5,69	0,29	5,94	0,37	9,42	0,17	9,58	0,12
Syllable structure of words	7,00*	0,57	8,43*	0,62	6,19*	0,36	7,13*	0,50	9,92	0,06	9,92	0,06

Notes: \* -  $p < 0,05$  confident differences after dance-correction program

In this aspect the worked out by us dance-correction choreographic classes helped to creatively realize this demand; to develop sense of rhythm and strengthen skeleton and muscles; to stimulate memory, attention, thinking and imagination [7]. Such experience can help a child to successfully master different creative-art and sport kinds of activities, to train choreography and gymnastic; to master musical instruments. Dance-correction exercises facilitate activation of short term and long term memory (cognitive elements) for reproduction dance figures. Such exercises actively influence on motor neurons of cortex and develop motor centers [11, 26, 30]. It is known that music is perceived by both semi-spheres [30]. That is why with correctly organized choreographic trainings in cortex complex functional system of focuses can appear. It is conditioned by interconnected activity in different sensor (hearing, visual, tactile, pro-prioceptive and etc) and in motor and frontal sectors of both semi-spheres. It also relates to Brock's area, which participates in speech formation [6, 30]. Constant changes of dance compositions and rhythms stimulate brain neurons for re-switching and, thus, develop functional mobility of nervous processes [17, 22, 28]. With it specially selected music optimizes brain functioning and facilitates development of verbal and non-verbal intellect.

Thus, it was found that application of the worked out by us means and techniques of correcting orientation ensure achievement of the set target. Such approach contains element of novelty. We supplemented and

expanded results of other scientists. We showed potentials of children's psycho-physical development through including fit ball dance gymnastic, game fitness, logorhythmic in typical program of children choreography [3, 9, 13]. Besides, we supplemented information about positive changes in static and dynamic coordination [7]. Results of a number of authors about need in complex and rational correction methods' application in preschool education were supplemented. Such approach results in increase of cognitive functions, physical qualities and psycho-physical condition effectiveness in preschool children with speech disorders.

The presence of preschool children's certain motor skills creates a basis for targeted pedagogic influences. Musical-rhythmic movements train brain, increase mobility of nervous processes. We can surely assume that dance-choreographic classes with application of ergo and art therapy can become an efficient rehabilitation mean for children with speech disorders.

It is assumed that correctly organized dance-correction work with preschool children will permit them to master successfully different creative-art and sport activities in the future; will help them to further master choreography, gymnastic, musical instruments and etc.

#### Conclusions:

1. The fulfilled comparison showed that physical condition and psycho-physical growth of preschool children with speech disorders lagged behind healthy

children. Characteristic feature of such children is critical attitude to own speech insufficiency and conscious avoiding oral answers.

2. Positive changes in 4-6 yrs children with speech disorders under influence of choreographic classes, base on dance-correction program, were registered.

3. Cluster analysis showed increase of homogeneity in positive changes of psycho-physical condition, cognitive functions and dance abilities in children with speech

disorders under influence of dance-correction program of trainings.

4. Positive changes in speech functions under influence of the worked out dance-correction program were registered.

#### Conflict of interests

The authors declare that there is no conflict of interests.

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