

A Comparison of the Neuropsychological Features of young Children with Neuropsychological/Developmental Learning Disabilities and Normal Children in the Pre-school stage

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Abstract

Aim: The present study was carried out in order to compare the neuropsychological features of pre-school children with neuropsychological/developmental learning disabilities with those of normal pre-school children. **Method:** The study was causative-comparative based. The study sample was a group of twenty children aged 4-6 years with neuropsychological/developmental learning disabilities and twenty 4-6 year old normal children (without neuropsychological/developmental disability). All children were pre-school Isfahani (a major city in Iran) children and were chosen after two stages of sampling by random multi-stage-performance cluster-sampling recognition test method. The study instruments were the NEPSY neuropsychological test, The Wechsler pre-school and primary scale of intelligence (WPPSI) and the index of neuropsychological/developmental learning disability symptoms for pre-school children. **Results:** the resulting data was analyzed using the multi-variable variance analysis statistical method (Manova). The study results showed that there was a significant difference between neuropsychological aspects of Attention/Executive Functions, Language, Sensory-motor functions, Visuospatial processing, Memory and Learning, of children with neuropsychological/developmental learning disabilities and the children without such disabilities. **Conclusion:** young pre-school children with learning disabilities have neuropsychological deficiencies which should be diagnosed at an early stage with reliable means of diagnosis, in order to initiate timely action for the child's recovery.

Key words: Neuropsychological Learning Disabilities, Attention/Executive Functions, Language, Sensory-motor functions, Visuospatial processing, Memory and Learning, Young Pre-school Children.

Introduction

Neuropsychological/developmental learning disabilities in young children is a relatively new area of research which scholars have put under scrutiny because of the high importance of the pre-school years and the necessity of early intervention to help children with such disabilities (Lerner, Lowenthal & Egan, 2003; Steele, 2004; Dowker, 2005; Gersten, Jordan & Flojo, 2005; Coleman, Buysse & Neitzel, 2006; Gartland & Strosnider, 2007). The most important issue for the scholars in this regard has been neuropsychological

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explanations for the diagnosis and early intervention to help pre-school children with neuropsychological/developmental learning disabilities (Semrud-clikeman, 2005). Therefore many studies on the neuropsychological features of such children have been carried out in recent years.

One important neuropsychological characteristic of young children with neuropsychological/developmental learning disabilities, is inability regarding attention/executive functions (Denckla, 2003; Semrud-clikeman, 2005). Executive functions control behavior output and generally include stimulator control and inhibition, pragmatic memory, open cognition, planning and organization (Denckla, 1991 & 1996). The analysis of the related factors has established four factors of executive function: response hindrance, pragmatic memory, self regulation and inter-relational control (Miyake, Friedman, Emerson, Witzki, & Howerter, 2000). Broadly speaking the majority of scholars consider executive functions are self-regulating; they show the child's ability for hindrance, self-change, planning, organization, the use of pragmatic memory, problem solving, and targeting tasks (Pennington & Ozonoff, 1996; Seidman, 2006). Attention is a series of complex mental functions which include focusing or objective involvement, constancy or endurance, and awareness over a long period of time, decoding of stimulative features, and the change of focus from one objective to another (Denckla, 2003; Seidman, 2006). A large body of research has shown the relatively low ability in executive functions and attention of young children with neuropsychological/developmental learning disabilities. A number of researchers including Reynolds (1984), Holborow & Berry (1986), Denckla (1989), Gilger, Pennington & DeFries (1992), Pennington, Groisser & Welsh (1993), Semrud-clikeman, Biederman, Sprich, Krifcher, Norman & Faraone (1992), Korkman, Liikanen & Fellman (1996), Logan, Schachar & Tannock (1997), Faraone, Biederman, Monuteaux, Doyle & Seidman (2001), DuPaul, McGoey, Eckert & VanBrakle (2001) Seidman, Biederman, Monuteaux, Doyle & Faraone (2001), Dalen, Sonuga-Barke, Hall & Remington (2004), Bohm, Smedler & Forssberg (2004), have shown that pre-school children with neuropsychological/developmental learning disabilities reveal significantly lower executive function and attentive ability in comparison with their normal peers.

Another early neuropsychological sign in children with neuropsychological/developmental learning disabilities is linguistic incompetencies (Semrud-clikeman, 2005). These include phoneme cognition, phonemic processing, naming capacity, linguistic understanding, hearing memory, cognition of linguistic structural changeability and fluency in speech utterance. From a psychological/developmental point of view these abilities originate in the early years of child growth (Korkman, Kirk & Kemp, 1998). Various studies have shown that pre-school children with neuropsychological/developmental learning disabilities have serious problems related to linguistic abilities. Abilities such as: phoneme cognition, speedy automated naming and linguistic output. These problems are basis of a number of developmental language disorders and cause serious obstruction to the child's future schooling (Kirk, 1992; Korkman & Pesonen, 1994; Korkman & Peltomaa, 1993; Torgesen, Wagner & Rashotte, 1994; Bishop, North & Donlan, 1996; Berninger, 1996; Catts, 1997; Lowenthal, 1998; Steele, 2004; Semrud-clikeman, 2005; Coleman, Buysse & Neitzel, 2006; Swanson, Saez & Gerber, 2006; Gartland & Strosnider, 2007).

Another feature of children with neuropsychological/developmental learning disabilities relates to sensory-motor functions (Korkman & Pesonen, 1994). These functions are important intermediary faculties which introduce complex and objective systems underlying cognition (Luria, 1973). The harmonic development of sensory-motor functions begins in early childhood and continues through to the schooling years (Lockman, 1990). Many studies have shown that these children are significantly behind their normal peers in neuropsychological sensory-motor function tests such as finger cognition, tactile processing, modelling hand posture, and simulating specific movement (Levine, 1985; Lockman, 1990; Berninger & Rutberg, 1992; Kaplan, 1988; Steele, 2004; Semrud-clikeman, 2005; Gartland & Strosnider, 2007).

Visuospatial processing is another feature related to children with neuropsychological/developmental learning disabilities. This type of processing is a complex procedure involving many interrelated sub-division and includes visualization, objective differentiation, orientation, right and left differentiation, realization of spatial relations, model coping and making and non-linguistic problem-solving (Cronin-Golomb & Braun,

1997). The growth and development of these minor abilities takes shape in early childhood and with increase in attention, memory capacity, experience and teaching, develops during childhood years. Many researchers including, Winogron, Knights & Bawden, (1984); Korkman & Peltomaa, 1993; Goldstein & Britt, 1994; Williams & Dykman, 1994; Steele, 2004; Semrud-clikeman, 2005; Dowker, 2005; Gersten, Jordan & Flojo, 2005; Gartland & Strosnider, 2007, in their research have shown that the performance of children with neuropsychological/developmental learning disabilities in neuropsychological tests on visuospatial processing (copying models, block-making, and orientation) is significantly lower than normal children.

Another feature related to children with neuropsychological/developmental learning disabilities is "memory and learning" (Korkman, Kirk & Kemp, 1998). In a large number of studies, it has been shown that small children with neuropsychological/developmental learning disabilities in neuropsychological tests including immediate memory for words, naming memory, memory of faces, pragmatic memory and learning index had significantly lower performance in comparison with their normal peers (Aram, Ekelman & Nation, 1984; Wilson, 1992, Siegel & Ryan, 1989; Korkman & Pesonen, 1994; Korkman, Hakkinen-Rihu, 1994; Wang & Bellugi, 1994; Steele, 2004; Dowker, 2005; Gersten, Jordan & Flojo, 2005; Semrud-clikeman, 2005; Swanson & Jerman, 2007; Seidman, 2006; Valera & Seidman, 2006; Gartland & Strosnider, 2007).

Therefore what can be concluded from the existing literature is that children with neuropsychological/developmental learning disabilities are in some ways different; the aim of the present study is to survey and compare the neuropsychological features of pre-school children with neuropsychological/developmental learning disabilities with normal pre-school children (without neuropsychological learning disabilities). In other words considering that the main line of research in our country has been related to primary school years and learning disabilities associated with formal education, the aim of the present study is neuropsychological/developmental learning disabilities. These disabilities are the basis of later learning disabilities which appear in primary education. In order to carry out this research the following hypotheses were surveyed and tested:

- 1- There is difference between the attention/executive functions of children with neuropsychological/developmental learning disabilities and of young normal children.
- 2- There is difference between the language skills of children with neuropsychological/developmental learning disabilities and of young normal children.
- 3- There is difference between sensory-motor functions of children with neuropsychological/developmental learning disabilities and of young normal children.
- 4- There is difference between visuospatial processing of children with neuropsychological/developmental learning disabilities and of young normal children.
- 5- There is difference between learning and memory of children with neuropsychological/developmental learning disabilities and of young normal children.

Method: Society, the Sample Group and Sampling Method

Considering the underlying basis and aim of this study which was a comparison between the performance of children with neuropsychological/developmental learning disabilities and the performance of normal children, the method of the study is causative/comparative based. The study was carried out with two groups of 4-6 year-old Isfahani children. In order to choose test material multi-stage random cluster sampling method was used as follows: first from each one of Isfahani's educational areas (Isfahan has five educational areas) two kindergartens were chosen which makes an overall number of ten kindergartens. Then, twenty classes were chosen randomly from among the ten kindergartens. Based on the check-list for the specification of children with neuropsychological/developmental learning disabilities and the Wechsler pre-school IQ test, twenty children with neuropsychological/developmental learning disabilities were chosen from among the 500 pupils of the twenty classes. Twenty normal children with same circumstances status- were also chosen and the two groups were tested with the NEPSY neuropsychological test.

Study Material

In the present study the following materials have been used:

1- The NEPSY neuropsychological test

NEPSY is a complete, flexible and appealing test for the evaluation of neuropsychological development designed for pre-school and primary school children aged between three and six years of age. Its name is derived from neuropsychology; "NE" from "neuro" and "psy" from "psychology" (Korkman, Kirk & Kemp, 1998). The final version of this test was circulated by Korkman, Kirk & Kemp, in 1997. This test was first evaluated child neuropsychological development in five domains and with twenty-five sub-test. These domains are including: 1-attention/executive functions; 2-language; 3-sensory-motor functions; 4-visuospatial processing; 5-memory and learning. This test was first critically reviewed in Iran (Isfahan) by Abedi (1386A.H.) and used for the first time.

2- The Wechsler pre-school and primary scale of intelligence (WPPSI)

The Wechsler pre-school scale of intelligence has been prepared on the basis of the Wechsler IQ scale for children (WISC) and is an extension of it for the determination of intelligence in 4-6/5 year-olds. This scale constitutes eleven tests, six of which are language based and five are non-linguistic (practical). It was designed by Wechsler in 1967. The test was critically reviewed in Iran by Razavie and shahim (1369A.H.) and has been used in the present study for legitimacy (determine the validation). The final indices have been reported from a range between 0.44 to 0.94 for eleven tests based on the test-retests method. In order to authorize the scale it was paralleled with the Wechsler scale for children (6 year-olds). The range of change for correlational indices was 0.24 to 0.69.

3- Symptoms index for learning disabilities in pre-school children

Steele (2004), by the review of the literature related to the diagnosis and early intervention of small children prone to learning disabilities has produced a twenty-two part check-list for pinpointing disabled pre-school children. The scoring of this list is in terms of degrees and is filled in by tutors. In this study it was correlated to the NEPSY scale for legitimacy and the calculated indice was 0.79. In addition the uniformity among scorers was 0.93. In this study, in addition to the symptoms check-list of learning disabilities in pre-

school children, the NEPSY test and the diagnosis of one psychiatrist and one psychologist were also employed to ensure correct diagnosis of the learning disabilities of the children; the final decision was based on the uniformity of all three sources.

In order to analyze the data of the study in a statistically descriptive manner, the mean and standard deviation, and in order to compare the neuropsychological features of children with neuropsychological/developmental learning disabilities and normal children, multi-variable variance analysis (Manova) was employed.

Results

Table1- Mean and Standard Deviation of two groups of children with neuropsychological/developmental learning disabilities and normal children in NEPSY Subtests and Domains

NEPSY's Domains	Normal		Neuropsychological/Developmental Learning Disability	
	Mean	Std.Deviation	Mean	Std.Deviation
Attention/Executive functions	98.1	9.13	76.5	9.5
Tower	10.4	1.81	7.35	1.66
Auditory Attention	10.7	1.26	7.85	1.89
Statue	10.45	4.35	8.85	3.56
Visual Attention	10.25	2.89	7.7	1.21
Design Fluency	11.15	2.66	7.9	1.61
Knock and Tap	10.65	3.49	8.3	3.26
Language	105.5	13.68	77.05	5.98
Body Part Naming	11.85	1.84	7.4	2.13
Phonological Processing	10.3	1.62	7.75	2.09
Speeded Naming	10.65	2.81	7.55	3.06
Comprehension of Instructions	10.65	2.58	7.9	2.35
Verbal Fluency	10.95	2.87	7.95	2.87
Oromotor Sequences	10.65	3.85	7.1	3.98
Sensorimotor Functions	99.05	13.47	77.3	6.95
Fingertip Tapping	11.2	2.06	7.45	2.01
Imitating Hand Positions	10.8	2.16	7.65	1.22
Visuomotor Precision	11.15	1.84	7.6	1.35
Manual Motor Sequences	10.1	3.52	9.7	3.33
Finger Discrimination	11.55	5.73	7.95	6.52
Visuospatial Processing	102.2	10.65	75.1	8.5
Design Copying	11.15	2.27	7.35	1.98
Arrows	11.2	3	7.25	1.68

Block Construction	7.85	2.47	7.7	1.94
Route Finding	8.9	0.85	7.05	0.75
Memory and Learning	101.8	16.1	77.7	8.11
Memory for Faces	11.65	2.7	7.35	1.84
Memory for Names	11.45	1.99	7.2	1.9
Narrative Memory	11.7	1.92	8.65	2.24
Sentence Repetition	11.55	1.66	6.75	1.4

Hypothesis 1- There is difference between the attention/executive functions of children with neuropsychological developmental learning disabilities and of young normal children.

Table 2- The results of multivariable analysis of variance (Manova), the differences of two groups of children with neuropsychological/developmental learning disabilities and normal children in domain of attention/executive functions

Source	Statistical Parameters				
	wilk's Lambda	F	Sig.	Eta ²	Observed Power
Group	0.226	18.82	0.001	0.77	100

Table 3- The results of multivariable analysis of variance (Manova), the differences of two groups of children with neuropsychological/developmental learning disabilities and normal children in subtests of attention/executive functions

Sources	Depended Variable	Statistical Parameters						
		Sum of Squares	df	Mean Squares	F	Sig.	Eta ²	Observed Power
Group	Tower	93.02	1	93.02	30.64	0.001	0.44	100
	Auditory Attention	81.22	1	81.22	31.25	0.001	0.45	100
	Statue	65.02	1	65.02	13.14	0.001	0.25	0.94
	Visual Attention	129.06	1	129.6	14.33	0.001	0.27	0.95
	Design Fluency	105.6	1	105.6	21.77	0.001	0.36	0.99
	Knock and Tap	189.2	1	189.2	22.41	0.001	0.36	0.99

The information contained in charts 2 and 3 shows the results of the multi-variable variance analysis test (Manova) of comparison between the two groups of children i.e. the group with neuropsychological/developmental learning disabilities and the group of their normal peers, in terms of attention/executive functions and related subtests. Based on these results there is a significant difference between the two above mentioned group of children; the children with neuropsychological/developmental learning disabilities showed a lower performance related to attention/executive functions in comparison with normal children. The square root is between 1 and 77 percent, that is, 77 percent difference between the two groups is manifest in relation to attention/executive functions.

Hypothesis 2- There is difference between the language of children with neuropsychological developmental learning disabilities and of young normal children.

Table 4- The results of multivariable analysis of variance (Manova), the differences of two groups of children with neuropsychological/developmental learning disabilities and normal children in domain of language

Source	Statistical Parameters	wilk's Lambda	F	Sig.	Eta²	Observed Power
Group		0.246	16.88	0.001	0.75	100

Table 5- The results of multivariable analysis of variance (Manova), the differences of two groups of children with neuropsychological/developmental learning disabilities and normal children in subtests of language

Statistical Parameters Sources Depended Variable		Sum of Squares	df	Mean Squares	F	Sig.	Eta ²	Observed Power
		Group	Body Part Naming	65.02	1	65.02	18.44	0.001
Phonological Processing	96.1		1	96.1	11.08	0.002	0.22	90
Speeded Naming	75.62		1	75.62	12.36	0.001	0.24	92
Comprehension of Instructions	198.02		1	198.02	49.7	0.001	0.56	100
Verbal Fluency	90		1	90	12.48	0.001	0.34	93
Oromotor Sequences	429.2		1	429.2	11.94	0.002	0.33	92

The information contained in charts 4 and 5 shows the results of the multi-variable variance analysis test (Manova) of comparison between the two groups of children i.e. the group with neuropsychological/developmental learning disabilities and the group of their normal peers, in terms of language and related subtests. Based on these results there is a significant difference between the two above mentioned group of children; the children with neuropsychological/developmental learning disabilities showed a lower performance related to language in comparison with normal children. The square root is between 1 and 75 percent, that is, 75 percent difference between the two groups is manifest in relation to language.

Hypothesis 3- There is difference between the Sensory-motor functions of children with neuropsychological developmental learning disabilities and of young normal children.

Table 6- The results of multivariable analysis of variance (Manova), the differences of two groups of children with neuropsychological/developmental learning disabilities and normal children in domain of Sensory-motor functions

Source	Statistical Parameters				
	wilk's Lambda	F	Sig.	Eta ²	Observed Power
Group	0.163	34.93	0.001	0.83	100

Table7- The results of multivariable analysis of variance (Manova), the differences of two groups of children with neuropsychological/developmental learning disabilities and normal children in subtests of Sensory-motor functions

Sources	Depended Variable	Statistical Parameters						
		Sum of Squares	df	Mean Squares	F	Sig.	Eta ²	Observed Power
Group	Fingertip Tapping	140.6	1	140.6	33.78	0.001	0.47	100
	Imitating Hand Positions	99.22	1	99.22	32.02	0.001	0.45	100
	Visuomotor Precision	126.02	1	126.02	48.2	0.001	0.55	100
	Manual Motor Sequences	193.6	1	193.6	4.67	0.037	0.11	0.55
	Finger Discrimination	129.6	1	129.6	56.02	0.001	0.59	100

The information contained in charts 6 and 7 shows the results of the multi-variable variance analysis test (Manova) of comparison between the tow groups of children i.e. the group with neuropsychological/developmental learning disabilities and the group of their normal peers, in terms of Sensory-motor functions and related subtests. Based on these results there is a significant difference between the two above mentioned group of children; the children with neuropsychological/developmental learning disabilities showed a lower performance related to Sensory-motor functions in comparison with normal children. The

square root is between 1 and 83 percent, that is, 83 percent difference between the two groups is manifest in relation to Sensory-motor functions.

Hypothesis 4- There is difference between the visuospatial processing of children with neuropsychological developmental learning disabilities and of young normal children.

Table 8- The results of multivariable analysis of variance (Manova), the differences of two groups of children with neuropsychological/developmental learning disabilities and normal children in domain of visuospatial processing

Statistical Parameters		wilk's Lambda	F	Sig.	Eta ²	Observed Power
Source						
Group		0.263	24.5	0.001	0.73	100

Table 9- The results of multivariable analysis of variance (Manova), the differences of two groups of children with neuropsychological/developmental learning disabilities and normal children in subtests of visuospatial processing

Statistical Parameters		Sum of Squares	df	Mean Squares	F	Sig.	Eta ²	Observed Power
Sources	Depended Variable							
Group	Design Copying	144.4	1	144.4	31.7	0.001	0.45	100
	Arrows	156.2	1	156.2	26.3	0.001	0.41	0.99
	Block Construction	90	1	90	18.1	0.001	0.32	0.98
	Route Finding	7.22	1	7.22	0.44	0.001	0.30	0.97

The information contained in charts 8 and 9 shows the results of the multi-variable variance analysis test (Manova) of comparison between the two groups of children i.e. the group with neuropsychological/developmental learning disabilities and the group of their normal peers, in terms of visuospatial processing and related subtests. Based on these results there is a significant difference between the two above mentioned group of children; the children with neuropsychological/developmental learning disabilities showed a lower

performance related to visuospatial processing in comparison with normal children. The square root is between 1 and 73 percent, that is, 73 percent difference between the two groups is manifest in relation to visuospatial processing.

Hypothesis 5- There is difference between the learning and memory of children with neuropsychological developmental learning disabilities and of young normal children.

Table 10- The results of multivariable analysis of variance (Manova), the differences of two groups of children with neuropsychological/developmental learning disabilities and normal children in domain of learning and memory

Source	Statistical Parameters	Wilk's Lambda	F	Sig.	Eta ²	Observed Power
	Group		0.149	49.9	0.001	0.85

Table 11- The results of multivariable analysis of variance (Manova), the differences of two groups of children with neuropsychological/developmental learning disabilities and normal children in subtests of learning and memory

Sources	Depended Variable	Statistical Parameters	Sum of Squares	df	Mean Squares	F	Sig.	Eta ²	Observed Power
		Group	Memory for Faces	184.9	1	184.9	34.59	0.001	0.47
	Memory for Names	180.6	1	180.6	77.8	0.001	0.67	100	
	Narrative Memory	93.02	1	93.02	8.56	0.006	0.18	0.81	
	Sentence Repetition	230.4	1	230.4	53.8	0.001	0.58	100	

The information contained in charts 10 and 11 shows the results of the multi-variable variance analysis test (Manova) of comparison between the two groups of children i.e. the group with neuropsychological/developmental learning disabilities and the group of their normal peers, in terms of learning and memory and related subtests. Based on these results there is a significant difference between the two above mentioned group of children; the

children with neuropsychological/developmental learning disabilities showed a lower performance related to learning and memory in comparison with normal children. The square root is between 1 and 85 percent, that is, 85 percent difference between the two groups is manifest in relation to learning and memory.

Discussion and Conclusion

The findings of this study was in harmony with the findings of other researchers including, Reynolds, 1984; Holborow & Berry, 1986; Denckla, 1989; Gilger, Pennington & DeFries, 1992; Pennington, Groisser & Welsh, 1993; Semrud-clikeman, Biederman, Sprich, Krifcher, Norman & Faraone, 1992; Korkman, Liikanen & Fellman, 1996; Logan, Schachar & Tannock, 1997; Faraone, Biederman, Monuteaux, Doyle & Seidman, 2001; DuPaul, McGoey, Eckert & VanBrakle, 2001; Seidman, Biederman, Monuteaux, Doyle & Faraone, 2001; Dalen, Sonuga-Barke, Hall & Remington, 2004; Bohm, Smedler & Forsberg, 2004. These researchers have shown that children with neuropsychological/developmental learning disabilities in the pre-school stage have a significantly lower performance in comparison with normal pre-school children an attention/executive functions. Such researchers show that deficiency in attention/executive functions shown by pre-school children forewarns their future academic performance. These abilities are internal processes with which the child achieves academic tasks using learning abilities and control.

The findings of Study showed that pre-school children with neuropsychological/developmental learning disabilities have serious problems related to linguistic abilities. Abilities such as: phoneme cognition, speedy automated naming and linguistic output. These findings of this study are in harmony with the findings of other researchers including, Kirk, 1992; Korkman & Pesonen, 1994; Korkman & Peltomaa 1993; Torgesen, Wagner & Rashotte, 1994; Bishop, North & Donlan, 1996; Berninger, 1996; Catts, 1997; Lowenthal, 1998; Steele, 2004; Semrud-clikeman, 2005; Coleman, Buysse & Neitzel, 2006; Swanson, Saez & Gerber, 2006; Gartland & Strosnider, 2007. Researchers believe these problems are the basis of a number of developmental language disorders and academic learning disabilities and are a serious threat to the child's future education.

The findings of Study showed that pre-school children with neuropsychological/developmental learning disabilities have trouble with serious problems in sensory motor functions including movement coordination, hand movement, balance and perceptive-tactile ability. So, these children are significantly behind their normal peers in neuropsychological sensory-motor function tests such as finger cognition, tactile processing, modelling hand posture, and simulating specific movement. These findings of this study are in harmony with the findings of other researchers including, Levine, 1985; Lockman, 1990; Berninger & Rutberg, 1992; Kaplan, 1988; Steele, 2004; Semrud-clikeman, 2005; Gartland & Strosnider, 2007.

The findings of Study showed that pre-school children with neuropsychological/developmental learning disabilities have a significantly lower performance in comparison with normal pre-school children a visuospatial processing (Design copying, block construction & route finding). These findings of this study are in harmony with the findings of other researchers including, Winogron, Knights & Bawden, (1984); Korkman & Peltomaa, 1993; Goldstein & Britt, 1994; Williams & Dykman, 1994; Steele, 2004; Semrud-clikeman, 2005; Dowker, 2005; Gersten, Jordan & Flojo, 2005; Gartland & Strosnider, 2007.

In addition, the findings of Study showed that small children with neuropsychological/developmental learning disabilities in domain of "learning and memory" including immediate memory for words, naming memory, memory of faces, pragmatic memory and learning index had significantly lower performance in comparison with their normal peers. These findings of this study are in harmony with the findings of other researchers including, Aram, Ekelman & Nation, 1984; Wilson, 1992, Siegel & Ryan, 1989; Korkman & Pesonen, 1994; Korkman, Hakkinen-Rihu, 1994; Wang & Bellugi, 1994; Steele, 2004; Dowker, 2005; Gersten, Jordan & Flojo, 2005; Semrud-clikeman, 2005; Swanson & Jerman, 2007; Seidman, 2006; Valera & Seidman, 2006; Gartland & Strosnider, 2007.

One of the important results of the study is that the child, in order to achieve schooling tasks must have particular abilities which are acquired through experience, tutoring and learning. These abilities are Attention/Executive Functions, Language, Sensory-

motor functions, Visuospatial processing, Memory and Learning. Most children automatically put these abilities to effect. But small children with learning disabilities have trouble with these functions during learning and must be thought. Also a large body of research has shown that neuropsychological deficiency in pre-school children can forewarn the child's future educational problems, therefore it is necessary to have early diagnosis and intervention in order to help these children. In other words deficiency in the neuropsychological features of pre-school children who have learning disabilities can become embedded in higher age and cause serious hindrances in the child's academic progress.

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