

Effect Analysis of Psychomotricity and Aquatic Psychomotricity on the Motor Ability of Children with Developmental Disorder

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Abstract: This study aims to extend to classrooms the psychomotor and aquatic psychomotor programs designed in the research to help improve the motor ability of children with developmental disorder. A total of 16 children were divided into the test group A and the test group B, each consisting of 8 children. MOT 4-6 was applied to the subjects in the pre-test and post-test, respectively. The SPSS 18.0 program was used to process data in the study. The equivalence between groups was tested by calculating the average and the standard deviation using the independent samples t-test. First, the 16 weeks psychomotor and aquatic psychomotor programs were found to have positive effects on agility, coordination, balance and reaction of children with developmental disorder. Both programs showed statistically meaningful differences within the groups between before and after they were carried out ($p < 0.05$). Second, the 16 weeks psychomotor and aquatic psychomotor programs were found to have positive effects on fine motor skills of children with developmental disorder. Some meaningful differences were found in the aquatic psychomotricity group before and after conducting the programs while no meaningful difference was found in the psychomotricity group ($p < 0.05$). Third, the 16 weeks psychomotor and aquatic psychomotor programs were found to have positive effects on running power, the ability to speed and control movements. The psychomotricity group showed meaningful differences within the group before and after the programs while no meaningful difference was found within the aquatic psychomotricity group ($p < 0.05$). Results of this study and the results of previous studies, further research on effective program research and measurement methods for developmental ability of children with developmental disabilities will be needed.

Key words: Psychomotricity, aquatic psychomotricity, developmental disorder, motor ability, MOT4-6, psychomotor

INTRODUCTION

In recent studies on psychomotricity, studied the possibility of improvement the athletic abilities of children with developmental delays by psychomotor physical activity. As a result, the psychomotor program showed statistical improvement of the athletic abilities, especially agility, coordination, balance ability, jumping power and movement control ability. Also reported on improvement of athletic abilities, balance ability, body control and movement control ability by applying of psychomotor exercises to children with developmental delays (Jin-ho, 2010; Na-Ri, 2010).

According to Gil-Choi (2012), the researches of psycho motor started from 2005. Up to the year of 2009, non-intervention researches which focused on principle of psycho motor and/or investigations of applications were the main theme of trend on psycho motor researches. The year of 2010 was the starting point of increasing number of intervention case studies. From the

investigation of the most selected master degree theses for analysing research trends, among characteristics of variables, independent variables were mostly about psycho motor programs. And then more than half of dependent variables were about sociality and social skill. More than half of participants of preceding researches were people with developmental delay and/or intellectual disability and 90% of the participants were preschoolers and school-aged children (Gil-Choi, 2012).

From the investigations of preceding researched on aqua psycho motor which applied in this research, Aqua exercise had positive influences on developing physical coordination for children with developmental delay. (Sung-On, 2007) Application of aqua rehabilitative exercise had positive effects on children with intellectual disability (Chang-Wook, 2009).

According to the study of Carl and Barry, aquatic exercise has become popular in many advanced countries such as the USA, Japan, etc. in the perspective that multiple exercise performances can complement injury

rehabilitation and bring harmonious body development. Aquatic exercise is less affected by the gravity, so, it can be safely performed for children with developmental disabilities who show significantly weak coordination (Eichstaedt, 1992).

In addition, it can be an effective exercise method for children with developmental disabilities because they can perform relatively self-regulating and independent movements in the water.

The aquatic rehabilitation exercise improves the physical activity and exercise performance ability in relation to the body function. It also helps to maintain the normal posture to recover, maintain and promote the kinesthetic sense. In addition, it not only maintains the functional balance of each muscle but improves strength, endurance and coordination (Chang-Wook, 2006).

The purpose of this study is to compare and analyze the impact of psychomotor and aquatic psychomotor programs on motor ability of children with developmental disorder such as agility, coordination, fine motor skills, movement speed and control ability, balance, reaction and running power. Based on the findings, this study aims to extend to classrooms the psychomotor and aquatic psychomotor programs designed in the research to help improve the motor ability of children with developmental disorder.

MATERIALS AND METHODS

Subjects: This study is a comparative study on the effect of psychomotricity and aquatic psychomotricity on the motor ability of children with developmental disorder. The research subjects were children with social ages between 4 and 6 based on the social maturity scale (SA) test among 4-9 years old children with developmental disorder in S children development center in Goyang-si, Gyeonggi-do and D Exercise Development Centers in Seoul. A total of 16 children were divided into the test group A and the test group B, each consisting of 8 children. The tests were conducted for 16 weeks, twice per week and 50 min per time. MOT 4-6 was applied to the subjects in the pre-test and post-test, respectively.

Method: Duration of this research was July 6th, 2015 to November 13th, 2015. A psycho motor exercise program was administered 2 times per week and total of 32 times during 16 weeks on two experimental groups. And each session lasted for 50 min. Experimental group A proceeded their tasks at the Psycho Motor Class of S Children Development Center. Experimental group B had their tasks at the H swimming center. Before the psycho motor program and the aqua psycho motor program for

the pre-test, MOT 4-6 test equipment was used to measure movement performance ability. And after the 16 weeks program as the post-test, MOT 4-6 test equipment was used to find changes of movement performance ability. Application of program and the test were administered by a researcher and a licensed psycho motor professional.

Measuring tool: Zimmer and Volkamer from Germany invested MOT 4-6 (Motoriktest fuer vier-bis Sechsjaehrige Kinder) in 1973. In 1984, through 10 times of experiment, the MOT 4-6 test were revised and published. The second standardization was proceeded in 1987 with 601 children. In this research, the revised and complemented test equipment was used. Because of the differences of characteristics and level for children with disability, the test was administered based on participant's age differences from the results of their social maturity test.

Statistical analysis: The SPSS 18.0 program was used to process data in the study. The equivalence between groups was tested by calculating the average and the standard deviation using the Independent Samples t-test.

RESULTS AND DISCUSSION

Agility and coordination: From results of analyses of main effects through comparable sample t-test on agility and coordination, experimental group A showed statistically significant differences as shown on Table 1, pre (M = 5.87), post (M = 8.12).

Comparison of small muscle movement ability: From results of analyses of main effects through comparable sample t-test on small muscle movement ability, experimental group A showed statistically significant differences as shown on Table 2, pre (M = 3.12), post

Table 1: MOT 4-6 agility and coordination comparison between groups

Group	Pre-test		Post-test		t-values	p-values
	M	SD	M	SD		
Agility and coordination						
Test group A	5.87	1.125	8.12	0.991	-5.436	0.001
Test group B	5.25	0.886	8.12	0.991	-7.222	0.000

Table 2: MOT 4-6 small muscle movement ability comparison between groups

Group	Pre-test		Post-test		t-values	p-values
	M	SD	M	SD		
Small movement muscle ability						
Test group A	3.12	0.640	4.37	0.744	-5.000	0.002
Test group B	3.37	1.060	4.37	1.060	-3.742	0.007

Table 3: MOT 4-6 balance comparison between groups

Group	Pre-test		Post-test		t-values	p-values
	M	SD	M	SD		
Balance						
Test group A	4.87	1.125	8.00	1.069	-7.850	0.000
Test group B	5.00	1.511	8.00	1.309	-15.875	0.000

Table 4: MOT 4-6 reaction comparison between groups

Group	Pre-test		Post-test		t-values	p-values
	M	SD	M	SD		
Reaction						
Test group A	1.00	0.925	1.50	0.755	-1.528	0.170
Test group B	0.75	0.707	2.50	0.755	-3.862	0.006

Table 5: MOT 4-6 jumping power comparison between groups

Group	Pre-test		Post-test		t-values	p-values
	M	SD	M	SD		
Jumping power						
Test group A	1.25	0.707	2.25	0.886	-3.742	0.007
Test group B	1.12	0.353	2.25	0.462	-4.965	0.002

(M = 4.37). On the other hand, experimental group B did not have any statistically significant difference as pre (M = 3.37), post (M = 4.37).

Comparison of balance: From results of analyses of main effects through comparable sample t-test on balance, experimental group A showed statistically significant differences as shown on Table 3, pre (M = 4.87), post (M = 8.00). In addition, experimental group B also showed statistically significant difference as pre (M = 5.00), post (M = 8.00).

Comparison of reaction: From results of analyses of main effects through comparable sample t-test on reaction, both experimental group A and B did not show any statistically significant differences as shown on Table 4, group A: pre (M = 1.00), post (M = 0.75); group B: pre (M = 0.75), post (M = 2.50).

Comparison of jumping power: From results of analyses of main effects through comparable sample t-test on jumping power, experimental group A did not show statistically significant difference as shown on Table 5, pre (M = 1.25), post (M = 2.25). On the other hand, experimental group B showed statistically significant differences as pre (M = 1.12), post (M = 2.25).

Comparison of movement speed: From results of analyses of main effects through comparable sample t-test on movement speed, experimental group A showed statistically significant difference as shown on Table 6, pre (M = 4.50), post (M = 5.12). On the other hand, experimental group B did not show statistically significant difference as pre (M = 3.87), post (M = 5.50).

Table 6: MOT 4-6 movement speed comparison between groups

Group	Pre-test		Post-test		t-values	p-values
	M	SD	M	SD		
Movement speed						
Test group A	4.50	0.534	5.12	0.991	-1.667	0.140
Test group B	3.87	0.353	5.50	0.925	-4.333	0.003

Table 7: MOT 4-6 movement control ability comparison between groups

Group	Pre-test		Post-test		t-values	p-values
	M	SD	M	SD		
Movement control ability						
Test group A	3.25	0.886	3.87	0.353	-1.667	0.140
Test group B	3.87	0.353	5.50	0.755	-5.017	0.002

Comparison of movement control ability: From results of analyses of main effects through comparable sample t-test on movement control ability, experimental group A did not show statistically significant difference as shown on Table 7, pre (M = 3.25), post (M = 3.87). On the other hand, experimental group B showed statistically significant differences as pre (M = 3.87), post (M = 5.50).

Psychomotor physical activity program was effective to improve movement control ability for children with developmental delay. Jin-ho (2010) Aqua rehabilitative exercise improve physical activity and movement performance ability. It helps to maintain correct posture and restoration, maintaining, improvement of motor sensor. It also shares positive effects on improving muscle balance, strength, endurance, control ability and coordination with other researches (Chang-Wook, 2009). Psycho motor exercise program and psycho motor aqua program have been had positive effects on agility and coordination on children with developmental delay. Han reported that psycho motor exercise improve body control ability and 50% of motor coordination through self directed fun play for children with developmental delay (Hye, 2010). According to Seo's research when the pedalo which is one of psycho motor equipment was used on physical activity program, there was a improvement of physical motor coordination for pre-schoolers (Youn-Tae, 2005).

Published that aqua rehabilitative program had positive effects on coordination ability, hand action coordination and general action coordination ability. Moreover, aqua exercise has been positive impacts on improving physical coordination for children with disability. Also it could help to develop physical ability for children with disability (Sung-On, 2007; Chang-Wook, 2009).

Therefore, psycho motor exercises and psycho motor aqua programs are very effective. Psychomotor exercises effect on small muscle movements and balances, psycho

motor aqua program had positive effects on balances for children with developmental delay. These facts share same results with Kim's research said that psycho motor activity had positive effects on balance, physical control ability and movement control ability.

In addition, psychomotor activity had meaningful effects on improving physical coordination and maintaining for children with intellectual disability. Further, it had great effects on improving balance, energetic factors, speed factors and quickness factors. (Hera, 2012) Psychomotor exercise effect on movement speed for children with developmental delay and psychomotor aqua program had positive effects on running power and body movement control. More discussions on psycho motor aqua programs contain difficulty because there is lack of preceding research. However, from those results, psycho motor exercise shares same context by including Han's effectiveness of aqua program and Yoo's effectiveness of psychomotor exercise program for children with developmental delay.

Based on the results of this study and the results of previous studies, further research on effective program research and measurement methods for developmental ability of children with developmental disabilities will be needed.

CONCLUSION

First, the 16 weeks psychomotor and aquatic psychomotor programs were found to have positive effects on agility, coordination, balance and reaction of children with developmental disorder. Both programs showed statistically meaningful differences within the groups between before and after they were carried out ($p < 0.05$).

Second, the 16 weeks psychomotor and aquatic psychomotor programs were found to have positive effects on fine motor skills of children with developmental disorder. Some meaningful differences were found in the aquatic psychomotricity group before and after conducting the programs while no meaningful difference was found in the psychomotricity group ($p < 0.05$).

Third, the 16 weeks psychomotor and aquatic psychomotor programs were found to have positive effects on running power, the ability to speed and control movements. The psychomotricity group showed meaningful differences within the group before and after the programs while no meaningful difference was found within the aquatic psychomotricity group ($p < 0.05$).

The results of this study show that psychomotor and aquatic psychomotor programs help improve the overall motor ability of children with developmental disorder. Psychomotor programs made statistically meaningful

improvements in the children's agility, coordination, balance, running power and the ability to speed and control movements and the aquatic psychomotor programs made statistically meaningful improvements in their agility, coordination, fine motor skills and balance.

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