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THE EXAMINATION OF THE EFFECT OF GAMES AND AGILITY EXERCISES ON 10-11 YEAR OLD CHILDREN'S PROCESSING SPEED AND REACTION TIMES

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ABSTRACT

This study is suitable to a model of 42 students (21 experiment, 21 control) from a primary school located in Istanbul, were the aim is to examine the effect agility exercises and games on Simple, Selective and Distinctive (reaction, movement and response) reaction types. In the study, an "Academy Reaction Timer" was used to evaluate Simple, Selective and Distinctive reaction types, "Side Direction Alter", "T" and Short "T" tests were used as agility tests, and "WJ-R COG Cognitive Ability Test" was used to evaluate processing speed (Test 3: Visual Matching and Test 10: Draw Out". To present the differences between the pre and end tests of the control and experiment groups, analysis of Parametric Wilcoxon Signed Ranks were used and interpreted. The level of meaningfulness was taken as $p<0.05$. According to the findings a meaningful difference between the end tests of control and experiment groups was present and the difference was in favour of the end tests of the experiment group. The research showed that agility exercises and game applications both developed the agility of the children and a significant progress was noted in their processing speed. Besides, a positive development was seen in most of the parts of simple, selective and distinctive (reaction, movement and response) reaction types.

Key words: Processing speed, types of reaction (simple, selective, distinctive), agility.

INTRODUCTION

To gain the skill of action which is irrevocable for living beings, is much more important for children. By the help of playing games which is as necessary as nutrition, the child gains a development in his actions as well as the stimulants needed for his mental development. While the activity we call as a game mostly consists of exploration, research and trials, it can be stated that there is a strong relationship between psychomotor development and behaviour.

Evans (1999) stated that game is a learning laboratory where the child gains informative experience about the world and that physical activities enhance actions and actions enhance learning. Deary et al. (2001) have stated that a child in action activities enhances mental development as rich environmental stimulants accelerate the furcation of nerve cells.

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The first clear indicator of intelligence is the sense-motor period and during playing games many cognitive skills like sense-action abilities and decision-making, memory, strategy, observation, spatial reasoning, problem solving and creativity develop (Gardiner and Gander, 2004).

In the doctoral dissertation study of Çağlak Sarı (2012) which showed a relationship between processing speed and reaction, it was indicated that the relationship between the brain and actions were showing that psychomotor learning was primarily a product of the brain and as an indicator of intelligence (processing speed; a sub-dimension of intelligence) and behaviours that there was a relationship between experience and reaction time which means a quick response to the stimulant by the help of learning, and a relationship was present between agility, which is a change of action in the shortest time possible, and reaction. According to these findings, it is thought that a systematic and programmed exposure to agility exercises and games would contribute to the child's processing speed and reactions.

THE METHOD

The Purpose of the Study

In this study it is aimed to inspect the effect of agility exercises and games on Simple, Selective and Distinctive (reaction, movement and response time) reaction types and processing speed.

The Model and Workgroup of the Study

This is a study which is suitable to an experimental pattern study where the effects of applications with agility exercises and games will be looked into with a pre-test and post-test experiment and control group is used. The study group consists of 42 students aged 10-11 from a primary school in Istanbul.

Collecting Data and Analysis

After briefing the students and their teachers about the study, an "Academy Reaction Timer" was used to evaluate Simple, Selective and Distinctive reaction types, "WJ-R COG Cognitive Ability Test" was used to evaluate processing speed (Test 3: Visual Matching and Test 10: Draw Out" and "Side Direction Alter", "T" and Short "T" tests were used as agility tests (the researcher reduced the 10 m running distance of the "T" agility test by half as it wouldn't measure the agility correctly) were conducted to all 42 students individually.

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Following the pre-tests, to see whether there were any effects of agility on reaction types and processing speed, an 8-week study of agility exercises and games was conducted on the study group at the gym of the particular school.

After the study was completed, all the tests were carried out as given above as post-tests. A Non-Parametric Wilcoxon Signed Ranks test was conducted to show the differences of the pre and post-tests as all the data was computerized, analysed and interpreted. The meaningfulness level was $p<0.05$.

RESULTS

Table 1. The Mann Whitney-U Test Results Which Show The Difference Of Processing Speed Scores Between Experiment And Control Groups

Groups/Tests	N	Sum of Ranks	Mean Rank	U	z	p
Experiment -PS	21	646,50	30,79	25,500	-4,913	,000
Control - PS	21	256,50	12,21			

According to Table 1, the results of the non-parametric Mann Whitney-U test that was carried out to see whether the processing speed post-test scores meaningfully changed compared to the experiment-control group variable showed that the post-test results statistically changed in favour of the experiment group at a $p<0.01$ level.

Table 2. The Mann Whitney-U Test Results Which Show The Difference Of Agility (Side Direction Alter, "T", Short "T") Post-Test Scores Between Experiment And Control Groups

Groups/Tests	N	Sum of Ranks	Mean Rank	U	z	p
Experiment - SDA	21	334,00	15,90	103,500	-2,956	,003
Control - SDA	21	569,00	27,10			

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Experiment -"T"	21	379,00	18,07			
				148,500	-1,812	,070
Control -"T"	21	523,00	24,93			
Experiment - S "T"	21	356,00	16,95			
				125,000	-2,403	,016
Control - S "T"	21	547,00	26,05			

According to Table 2, the results of the non-parametric Mann Whitney-U test that was carried out to see whether the agility (Side Direction Alter, "T", Short "T") post-test scores meaningfully changed compared to the experiment-control group variable showed that the "side direction alter" post-test results statistically changed negatively at a $p<0.01$, short "T" post-test results statistically changed negatively at a $p<0.05$ and "T" post-test results didn't show any meaningful differences between experiment and control groups.

Table 3. The Mann Whitney-U Test Results Which Show The Difference Of Simple, Selective and Distinctive (reaction, movement and response time) Reaction Types Post-Test Scores Between Experiment And Control Groups

Groups/Tests	**N**	**Sum of Ranks**	**Mean Rank**	**U**	**z**	**p**
Exp. / Smpl."rt"	21	336,50	16,02			
				105,500	-2,893	,004
Cont./ Smpl."rt"	21	566,50	26,92			
Exp./ Smpl."mt"	21	419,50	19,98			
				188,500	-,805	,421
Cont./ Smpl."mt"	21	483,50	23,02			
Exp./ Smpl."rspt"	21	349,00	16,62			
				118,500	-2,579	,010
Cont./ Smpl."rspt"	21	554,00	26,38			
Exp. / Slct."rt"-	21	324,50	15,45			
				93,500	-3,196	,001
Cont./ Slct."rt"	21	578,50	27,55			

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Exp. / Slct.“mt”-	21	360,50	17,17			
				129,500	-2,290	,022
Cont./ Slct.“mt”	21	542,50	25,83			
Exp. / Slct.“rspt”-	21	324,00	15,43			
				93,000	-3,207	,001
Cont./ Slct.“rspt”	21	579,00	27,57			
Exp. / Dstnc .“rt”	21	368,50	17,54			
				133,00	-2,372	,034
Cont./ Dstnc. “rt”	21	534,50	25,45			
Exp. / Dstnc .“mt”	21	398,50	18,90			
				166,000	-1,371	,170
Cont./ Dstnc. “mt”	21	504,50	24,10			
Exp. / Dstnc .“rspt”	21	371,50	17,69			
				140,500	-2,013	,044
Cont./ Dstnc. “rspt”	21	531,50	25,31			

According to Table 3, the results of the non-parametric Mann Whitney-U test that was carried out to see whether the simple, selective and distinctive (reaction, movement and response time) reaction types post-test scores meaningfully changed compared to the experiment-control group variable showed that Smpl“rt”, Smpl.”rspt”, Slct.”rt” and Slct.”rspt” post-test results statistically changed at a $p<0.01$, Slct.”mt”, Dstnc.“rt” and Dstnc.“rspt, post-test results statistically changed at a $p<0.05$ negatively for the experiment group and the Smpl.”mt” and Dstnc.“mt, post-test results didn’t show any meaningful differences between the experiment and control groups statistically.

DISCUSSION

The study showed that an activity programme of agility exercises and games made a positive effect on processing speed as processing speed post-test scores indicated a $p<0.01$ meaningfulness level in favour of the experiment group. According to the results of studies investigating the relationship between intelligence and sport, most of them show that doing sports has a positive effect on intelligence. The common opinion of all these researchers is that the increase in brain activities during exercise is accelerating the reaction time as well.

In a study on children with learning disabilities where the effect of physical activities on mental development are shown, Dykens et al. (1998) state that exercises and sports reduce the adaptation disorder of children with learning disabilities and develop their physical compatibility, self-confidence and social competence.

Ölçücü (2007) states in his study that reaction time and agility characteristics have a meaningful relation and children with good reaction times also have good agility scores. Kirkendall (1986) has shown that children with the opportunity and time to do physical activities develop their motor skills and developing motor skills has positive effects on academic success. Kara et al. (2005) have delivered the opinion which showed that pupils who do more aerobic exercises not only increase their aerobic capacities, but also develop their mental activities.

The study showed that agility (side shift, "T" and short "T") post-test results were statistically negatively meaningful at a $p<0.01$ level, short "T" post-test results were statistically negatively meaningful at a $p<0.05$ level (that an activity program consisting of agility exercises and games decreased the children's agility test scores) and "T" post-test result didn't show any statistical differences (considering this test wasn't suitable to test agility of 10-11 year old children).

Büyükipekçi and Taşkın (2011) emphasize how important agility is on moving of the whole body rapidly and correctly when reacting to a stimulant and how important reaction time is when female volleyball players make instant decisions in attack and defence. This study also mentions that agility features of a player are developed if the player's reactions are good.

Korkmaz et al. (2004) express that 12 year old football players show more meaningful developments in their agility if a purpose-related training is conducted instead of a routine training. Hasçelik et al. (1989) and Öztaşyoner (2008) state that when children doing various sports are compared to children not doing sports, whatever the age group is, in the comparison of their visual and audial reactions children doing sports always have shorter reaction times. Karakuş et al. (1996) express that reaction time is in direct proportion to success in sports. Çömük and Erdem (2010) discovered that agility and reaction times in children doing ice-skating is better and that reaction time and agility features, which are effective on motor performances, could be enhanced via regular exercises and trainings.

The research showed that Simple, Multiple Choice and Distinguish (reaction, action and response times) reaction tests' post-test scores were statistically $p<0.01$ in Srt, Srst, MCrt and MCrst and $p<0.05$ in Bat, Drt and Drst favouring the experiment group and that agility exercises and games shortened the reaction times.

Both Polat (2009) where students with a 12-week badminton training and Yörükoğlu and Koz (2007) where students attending basketball trainings the reaction times of sedentary were compared and there was a meaningfulness favouring the students. Çimen and Günay (1996) stated that there was a 12% enhancement in the children's reaction times after an 8-week pave and strength training was conducted on 16 to 18 year old male table tennis players.

Kien and Chiodo (2003) express that 10 to 12 year old children attending sport game programmes have better reaction times compared to children that don't and Özer (2007) expresses that mini tennis training on 8 to 11 year old children develops their coordination skills and reaction times positively and therefore has a 21% enhancement on their reaction times. Kayapınar and Pehlivan (2002) indicated that pre-school children with 8-week action training have better visual simple reaction times,

audial simple reaction times and visual reaction times compared to children that haven't attended any programme.

The consensus of these researchers is that the increase in brain activity during exercises enhances reaction times. Researches in this field have generally focused on the physical side of the issue and there aren't many on mental issues.

Referring to studies where a meaningful relationship between reaction and processing speed is expressed, it could be explained with the development of their motor skills and the difference of their neurophysiological development if there is a positive effect of agility exercises and games of a program on agility and reaction types of the experiment group and if an increase is seen in children's processing speed where their agility and reaction times decreased. The findings of this study are parallel to many similar studies.

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