

Comparison of Selected Psychomotor Component and Intelligence In Relation to Different Age Group

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Abstract

Objective: The purpose of the present study was to compare the psychomotor variables (reaction time, kinesthetic perception & depth perception) among the different age categories.

Methods: . A total of two hundred and fifty male school children. The selected psychomotor components considered for this study were Reaction time, speed of movement, kinesthetic perception and Depth perception. To compare selected psychomotor components and intelligence in relation to different age group, the Descriptive statistics and Analysis of Variance was calculated.

Results: Intelligence level was more or less similar from age of 15 to 20 years. The reaction time was better in 15-16 years in comparison to other age group. However, Kinesthetic Perception (5.92 inches) and Depth Perception (3.34 cm) was better in 19-20 years in relation to other age group category. The analysis of data revealed that there were a significant difference in reaction time and Depth perception in various age groups whereas there was no difference in kinesthetic perception.

Conclusions: Thus it can be concluded that at the age of 15-16 years boys are having a better Reaction Time. Whereas in the age group of 19-20 years, Depth perception is better in comparison to other age groups.

KEYWORDS: Psychomotor, kinesthetic perception, depth perception etc

Psychomotor development refers to the maturation of psychological and muscular elements that constitute behavior. While intellectual development refers to the maturation of memory, reasoning and thought process. The rate of development of psychomotor may varies, even in a specific children and temporary pause may occur. The psychomotor domains includes all movement behaviour objectives that emphasize the ability to demonstrate motor skill requiring neuromuscular co-ordination, manipulation, sports skill and movements that are considered goals of the psychomotor domain(Phillips & Hornack,1929). Edwin Fleishman, director of American institute for research completed numerous research investigations on the nature of human abilities and their relationship to task proficiency. He identified the dimensions underlying human performance into two categories: the physical proficiency and psychomotor area. The factor of strength endurance, power stamina, flexibility, co-ordination and balance constituted the physical proficiency where as reaction time, speed of movement, visual perception and depth perception were the abilities considered under psycho-physiological or psycho-motor area.

The researcher undertook this present study in an opinion to know if one can trace out at which age the maximum changes (in relation to psychomotor) are occurring in school children, then, a physical education teacher can play a better role in child psychomotor development. A child may be found to be deficient in higher mental calculation or higher mental operation, but he may be quite capable in motor abilities. Such a child may be considered unfit to carry on the jobs which require

higher intelligence, but he may develop into a fine technician or machine. (Mathur, 1979) . In relation to above findings a tentative guess can be made that if the child psychomotor component is improved by training then there are chances that his mental operation may also improved. Thus, the researcher is trying to present the level of psychomotor ability present in different age group. Moreover, a comparison is also being made to test at which age the psychomotor and intelligence differs in relation to age.

Materials and Methods:

The subjects in this study were randomly selected. A total of two hundred and fifty male school children, aged 11 -20 years(Fifty subjects from each age groups) were selected for the purpose of the study. Selected age groups were selected: 11-12 years, 13-14 years, 15-16 years, 17-18 years and 19-20 years respectively. Before testing began subjects were briefed regarding the study protocol and informed consent was obtained The selected psychomotor components considered for this study were Reaction time, speed of movement, kinesthetic perception and Depth perception. Reaction Time was measured with the help of Anand’s Electronic Reaction Time apparatus in seconds, Kinesthetic perception was tested by Kinesthetic perception (Blind folded) Test and score was recorded in inches, Depth perception was measured by using Depth perception box (cm) and Intelligence was tested by using The Group Test of intelligence prepared by Dr. G.C. Ahuja.

Statistical Analysis:

To compare selected psychomotor components and intelligence in relation to different age group, the Descriptive statistics and Analysis of Variance was calculated.

Results:

The average values of Psychomotor components of all different age were: Intelligence Test 11-12 years (96.10± 13.63), 13-14 years (93.76± 13.90), 15-16 years (97.38± 13.18), 17-18 years (98.86± 12.05), 19-20 years (97.76± 12.02), Total(96.77± 12.99) ; Reaction Time(Sec) 11-12 years (.26± .04), 13-14 years (.19± .03), 15-16 years (.18± .02), 17-18 years (.19± .03), 19-20 years (.20± .03), Total (.20± .04); Kinesthetic perception (inches) 11-12 years (6.10± 2.36), 13-14 years (6.59± 2.33), 15-16 years (5.86±3.12), 17-18 years (6.28± 3.08), 19-20 years (5.92± 3.29), Total (6.15± 2.86); Depth Perception (Cm) 11-12 years (5.60± 1.78), 13-14 years (5.04± 1.66), 15-16 years (4.00± 1.72), 17-18 years (4.94± 1.43), 19-20 years (3.34± 1.49), Total (4.58± 1.80). From the above findings it was clear that the intelligence level was more or less similar from age of 15 to 20 years. The reaction time was better in 15-16 years in comparison to other age group. However, Kinesthetic Perception (5.92 inches) and Depth Perception (3.34 cm) was better in 19-20 years in relation to other age group category.

Table-1:Analysis of Variance of Intelligence and Selected Psychomotor component in relation to different age group

Variables		Sum of Squares	df	Mean Square	‘F’
Intelligence	Between Groups	761.46	4	190.37	1.129
	Within Groups	41299	245	168.57	
	Total	42060	249		
Reaction time (Sec)	Between Groups	0.184	4	0.046	37.315*

	Within Groups	0.302	245	0.001	
	Total	0.486	249		
Kinesthetic perception (inches)	Between Groups	17.5	4	4.375	0.531
	Within Groups	2019.7	245	8.244	
	Total	2037.2	249		
Depth Perception (Cm)	Between Groups	162.78	4	40.694	15.387*
	Within Groups	647.96	245	2.645	
	Total	810.74	249		

* Significant at 0.05 level of confidence

$$F_{0.05}(4, 245) = 2.39$$

Table – 1 revealed that significant difference was found in different age group in relation to Reaction time (F=37.315) and Depth Perception (F=15.387) as obtained ‘F’ value was greater than required F-ratio to be significant at 0.05 level with (4, 245) degree of freedom. However, no significant difference was found in case of Intelligence (F=1.129) and Kinesthetic Perception(F=0.531) as the obtained ‘F’ value was less than the required F-ratio to be significant at 0.05 level with (4, 245) degree of freedom.

Since the one way analysis of variance was found significant in relation to Reaction time and Depth Perception, the least significant difference (LSD) test was applied to find out which of the differences of the means amongst the different age groups were statistically significant.

Table – 1.2: Least Significant Difference Post-Hoc Test for Means of All Age groups in Relation to Reaction Time

Different Age Group					M.D.	C.D.
11-12 years	13-14 years	15-16 years	17-18 years	19-20 years		
0.26	0.19				0.07*	
0.26		0.18			0.08*	
0.26			0.19		0.07*	
0.26				0.2	0.06*	
	0.19	0.18			0.01	0.012396
	0.19		0.19		0	
	0.19			0.2	-0.01	
		0.18	0.19		-0.01	
		0.18		0.2	-0.02*	
			0.19	0.2	-0.01	

* Significant at .05 level.

It is evident from table – 2 that mean differences of all age group in relation to Reaction Time 11-12 & 13-14 years, 11-12 & 15-16 years, 11-12 & 17-18 years, 11-12 & 19-20 years and 15-16 & 19-20 years was found to be significant between different age groups at .05 level of confidence.

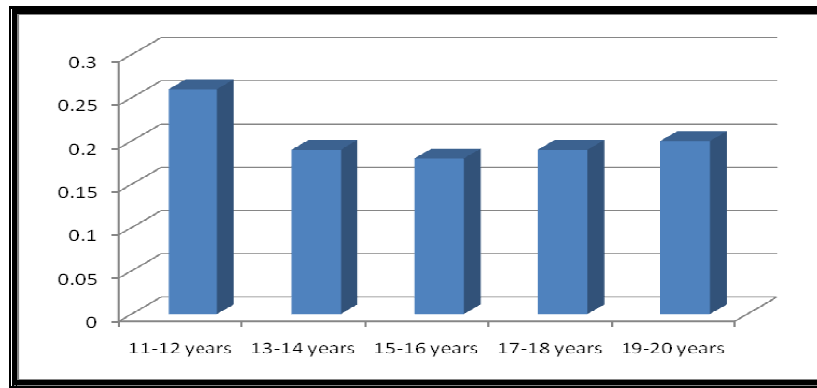


Fig. 1: Graphical representation of Mean of Reaction Time in relation to different age groups

Table – 1.3: Least Significant Difference Post-Hoc Test for Means of All Age groups in Relation to Depth Perception

Different Age Group					M.D.	C.D.
11-12 years	13-14 years	15-16 years	17-18 years	19-20 years		
5.6	5.04				0.56	
5.6		4			1.6*	
5.6			4.94		0.66	
5.6				3.34	2.26*	
	5.04	4			1.04*	0.637527
	5.04		4.94		0.1	
	5.04			3.34	1.7	
		4	4.94		-0.94*	
		4		3.34	0.66*	
			4.94	3.34	1.6*	

* Significant at .05 level.

It is evident from table – 2 that mean differences of all age group in relation to Reaction Time 11-12 & 15-16 years, 11-12 & 19-20 years, 13-14 & 15-16 years, 15-16 & 17-18 years, 15-16 & 19-20 years and 17-18 & 19-20 years was found to be significant between different age groups at .05 level of confidence.

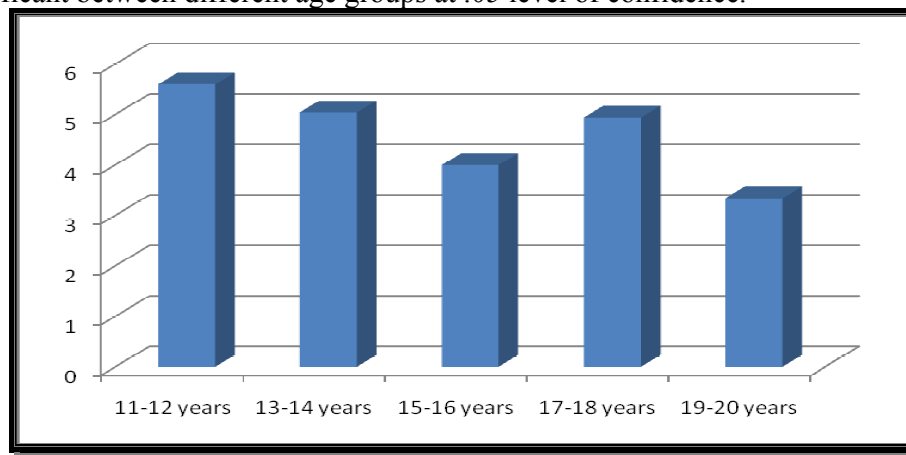


Fig. 2: Graphical representation of Mean of Depth perception in relation to different age groups

Discussion and Conclusions:

The analysis of data revealed that there were a significant difference in reaction time and Depth perception in various age groups whereas there was no difference in kinesthetic perception. Since the obtained value of 'F' ration in reaction time was found to be significant at 0.05 level, thus it was established that boys of various age group differed from each other in respect of their reaction time. It was noticed that boys of 11-12 years of age differed significantly when compared with the boys of 13-14 year, 15-16 years, 17-18 years and 19-20 years of age. Similarly the boys of 15-16 also difference with 19-20 years of age. Reaction time (RT) is an indirect index of the processing ability of central nervous system and a simple means of determining sensory-motor association and performance (Das, Gandhi & Mondal 1997). It is an index of cortical arousal (Malathi and Parulkar , 1989)) and a decrease in it indicates an improved sensorymotor performance and an enhanced processing ability of the central nervous system(Bhavanani et.al., 2003).

Reaction time probably depends upon the growth and development and after 13-14 years of age the rate of development was slowed down. However comparison of other groups did not yield the significant difference on reaction time test. Hill(1972) investigates the relationship of the reaction time and movement time of primary grade children to the variables of age, sex, motor ability and physical fitness. Statistical data revealed the relationship that reaction time and movement time decreased significantly with increasing age.

Similarly the boys of various age group differ significantly from each other in depth perception. It was noticed that the boys of 11-12 years of age differed significantly when compared with the boys of 15-16 years and 19-20 years of age. Boys of 13-14 differ from 15-16. Boys of 15-16 differ from 17-18. Boys of 17-18 differ from 19-20. Whereas, comparison of other age groups did not yield significant difference on depth perception.

When the boys of various age group were compared on kinesthetic perception, no significant difference was found.

When we go a step further we find that the development is spiral. As the age increases, development gradually and continuously proceeds. This doesn't mean that there is linear development i.e. the rate of growth and development is not uniform. There as some fluctuations in the process of development in relation to age. Moreover these variations in various psychomotor components of the subjects are probably influenced by other factors such as heredity and environment.

There was no significant difference in relation to intelligence in various age groups. Intelligence of an individual is generally contributed by various physiological, psychological, hormonal and nutritional factors. Subjects used in the study are basically sedentary normal and the questionnaire used for assessing their level of intelligence were mainly based on number series, mathematical instruction, vocabulary, opposite, reasoning etc which usually have very little thing to do with various psychomotor abilities. Thus it can be concluded that at the age of 15-16 years boys are having a better Reaction Time. Whereas in the age group of 19-20 years, Depth perception is better in comparison to other age groups.

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