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INVESTIGATION OF VISUAL AND AUDITORY SIMPLE REACTION TIME OF 11-18 AGED YOUTH

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Abstract:

The purpose of our study was to investigate visual and auditory basic reaction time differences in age groups of 11-18 youth. Totally 802 male (n = 401) and female (n = 401) sedentary children in the age groups as 11 (n = 87), 12 (n = 111), 13 (n = 100), and 14 (n = 104), 15 (n = 100), 16 (n = 100), 17 (n = 100), 18 (n = 100) voluntarily participated in this study. Computerized reaction time tests (VRT: www.humanbenchmark.com; ART: cognitivefun.net) was used for visual reaction time (VRT) and auditory reaction time (ART). Reaction time was measured five times, and the mean variable saved as millisecond in both tests. There was no statistical significance observed between male and female children ($p > 0.05$). Significant difference was found in VRT and ART parameters between age categories ($p < 0.05$). Significances were determined between 18 and 15 age groups, between 17 and 15 age groups and 16, between 15 age groups, 14 and 11, 12 age groups, between 13 and 11, 12 age groups, both VRT and ART ($p < 0.05$). In conclusion, it could be said that sedentary children perform faster reaction with increasing age between 11-18 years.

Keywords: reaction, visual, auditory, youth

Introduction

Faster thinking and faster reaching a solving problem are important features in daily life. It is also important for physiologically (Warden et al., 2001). Reaction determined that quickly movement from muscle tissue after a nervous stimulus. The stimulus may

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be related to visual, auditory and tactile. Reaction is a conscious response (Teichner, 1954, Drazin, 1961). Complexity or increasing number of stimulations is caused to prolongation of reaction time. Thus, reaction time separated two groups as simple reaction time and multiple choice reaction time (Spirduso, 1975; Collardeau et al., 2001). Simple reaction time is the passing time between single stimulus and reaction (Spirduso, 1980).

Reaction time is used for the passing time between stimulus and reaction (Fozard et al., 1994), and is important for athletic performance due to being an indicator of neuromuscular performance. Reaction time is a criterion of athletic performance about of speed and quickly decision making. According to this reason, reaction is a significant part of daily life and athletic performance. An athlete who has better reaction time is more successful than another athlete, has equal neuromuscular mechanisms, conditional ability, and technical capacity (Fozard et al., 1994; Collardeau et al., 2001).

It is wondered that simple reaction time difference between age groups that extended 11 to 18 ages. It was hypothesized that increasing age affect reaction time to better. The purpose of the present study is to investigate simple reaction time difference between age groups that extended 11 to 18 ages.

Materials and Methods

Participants: Totally 802 male (n = 401) and female (n = 401) sedentary children in the age groups as 11 (n = 87), 12 (n = 111), 13 (n = 100), and 14 (n = 104), 15 (n = 100), 16 (n = 100), 17 (n = 100), 18 (n = 100) voluntarily participated in this study (Table 1). All participants were informed about the aim of the research and the contents of that.

Table 1: Height and weight features of age groups

	Age group	n	Mean±SD
Height (cm)	11 age	87	143.68±6.37
	12 age	111	150.37±8.77
	13 age	100	156.04±7.85
	14 age	104	160.03±8.98
	15 age	100	169.61±5.14
	16 age	100	168.90±8.05
	17 age	100	168.90±7.54
	18 age	100	171.66±5.16
Weight (kg)	11 age	87	36.52±8.88
	12 age	111	41.43±8.19
	13 age	100	44.89±9.17
	14 age	104	50.12±9.56
	15 age	100	64.77±7.54
	16 age	100	61.04±9.92
	17 age	100	61.54±11.24
	18 age	100	68.46±8.49

Experimental Design: Experimental-Comparative scientific method is used in this study. Computerized reaction time tests were used to determine visual reaction times (VRT) and auditory reaction times (ART) of the subjects (VRT: www.humanbenchmark.com; ART: cognitivefun.net). Reaction times were measured 5 times and the mean variable saved as millisecond in both tests (Cuthbertson et al., 2015; Brewin et al., 2013). Heights and weights of the subjects were measured. Stadiometer which was degree of precision 0.01 m was used for height measurement (SECA, Germany) (Yıkılmaz et al., 2015; Bilgiç et al., 2016). Electronic scale which was degree of precision 0.1 kg was used for weight measurement (Özdal et al., 2013).

Statistical Analysis: In this study, data were recorded by using a statistical program (SPSS 22.0 for Windows, Chicago, Illinois, USA). In all the tests the significance level is accepted to be $p < 0.05$ like some other studies (Akil et al., 2011; Sivrikaya et al., 2012; Özdal et al., 2016). Kolmogorov-Smirnov test (Kolmogorov, 1933) used for normality like some other studies (Özdal, 2016a; 2016b). Kruskal-Wallis, One Way ANOVA and Tukey were used for the statistical analysis of the age groups. Age groups divided two sections (1) between 11 and 14 ages, and (2) between 15 and 18 ages.

Results

Table 2: VRT parameters analysis between age categories

		N	Mean±SD	p
VRT (ms)	11 age	87	393.49±52.80	14-11
	12 age	111	361.13±48.96	14-12
	13 age	100	335.19±39.92	13-11
	14 age	104	332.82±36.28	13-12
	15 age	100	334.56±48.70	
	16 age	100	313.04±50.88	16-15
	17 age	100	303.22±44.14	17-15
	18 age	100	303.86±45.68	18-15

The analyses of visual reaction times of teenagers are shown on table 2 according to ages. The mean of VRTs of 11, 12 and 13 years old are 393.49 ± 52.80, 361.13 ± 48.96 and 335.19 ± 39.92, respectively. According to the conducted statistical analysis, significant difference $p < 0.05$ was found between 13 and 11 years old and also between the 13 and 12 years old. The mean of VRTs of 14 years old is 332.82 ± 36.28 and significant difference $p < 0.05$ was found between 14 and 11, 12 years old. The mean of VRT of 15

years old is 334.56 ± 48.70 and that of 16 years old is 313.04 ± 50.88. According to the conducted statistical analysis, significant difference $p < 0.05$ was found between 15 and 16 years old. The mean of the VRTs of 17 is 303.22 ± 44.14 and that of 18 is 303.86 ± 45.68. As a result of the conducted statistical analysis, significant difference $p<0.05$ was found between 16 and 15 years old, 17 and 15 years old, 18 and 15 years old.

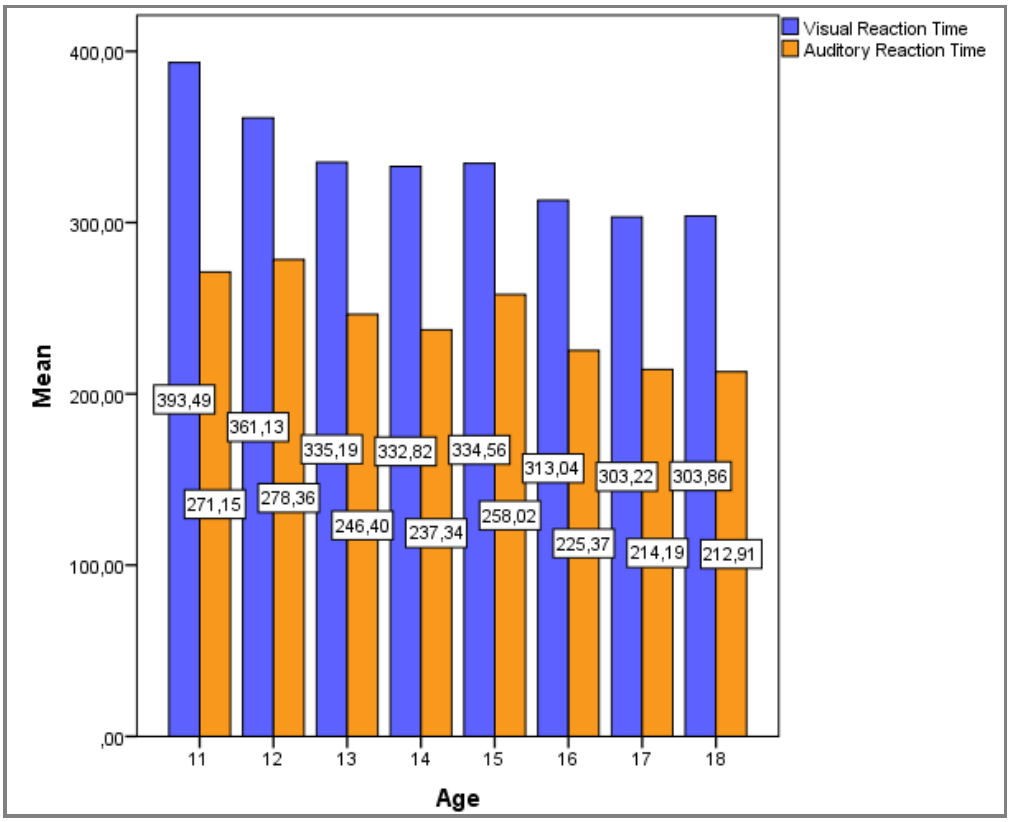

Figure 1: VRT and ART means of age groups

Table 3: ART parameters analysis between age categories

		N	Mean±SD	p
ART (ms)	11 age	87	271.15±63.28	14-11
	12 age	111	278.36±58.75	14-12
	13 age	100	246.40±65.88	13-11
	14 age	104	237.34±52.61	13-12
	15 age	100	258.02±57.78	
	16 age	100	225.37±48.67	16-15
	17 age	100	214.19±40.43	17-15
	18 age	100	212.91±49.31	18- 15

The analyses of auditory reaction times of children are shown on table 3 according to ages. The means of ARTs of 11, 12 and 13 years old are 271.15 ± 63.28,

278.36 ± 58.75 and 246.40 ± 65.88, respectively. According to the conducted statistical analysis, significant difference $p < 0.05$ was found between 13 and 11, 13 and 12. The mean of ART of 14 age is 237.34 ± 52.61 and significant difference $p < 0.05$ was found between this age's group and 11, 12 years old. The mean of 15 and 16 years old are 258.02 ± 57.78, 225.37 ± 48.67, respectively and significant difference $p < 0.05$ was found between 15 and 16 years old. The means of ARTs of 17 and 18 years old are 214.19 ± 40.43, 212.91 ± 49.31, respectively. As a result of the conducted statistical analysis, significant difference $p < 0.05$ was found between 16 and 15 years old, 17 and 15 years old, 18 and 15 years old.

Discussion and Conclusion

Reaction time is the most important and decisive component of a successful performance. Due to this, its significance has increased all fields. Even if most of athletes have same athletic skills and technical capacities, athletes who have faster reaction times are more successful than those who have slower reaction times. Reaction time has more significance and feature in many sports. Whether reaction times are faster or slower is also important to take the action before our competitors and to use accurate applications in the direction leading to a goal in terms of our perceptual, especially stimuli (Spirduso, 1980; Warden et al., 2001).

The fastest reaction time consists of the situation which requires only stimulatory and response (Magill and Anderson, 2007). There are various stimulants such as auditory, visual and tactile. Researchers have determined the stimulants, which result in the fastest reaction time, from the fastest reaction time to lower one; tactile stimulant (90-180 milliseconds), auditory one (120-180 milliseconds) and visual one (150-200 milliseconds), respectively (Hoyes Beehler and Kamen, 1986). Previous researches have demonstrated that the biggest improvement rate of reaction time can be during young ages and simple reaction time improves less than multiple reaction time (Agopyan, 1993).

The means of visual reaction times of 11-18 are that the means of ARTs of 11, 12 and 13 years old are 271.15 ± 63.28, 278.36 ± 58.75 and 246.40 ± 65.88, respectively. According to the conducted statistical analysis, significant difference $p < 0.05$ was found between 13 and 11, 13 and 12. The mean of ARTs of 14 years old is 237.34 ± 52.61 and significant difference $p < 0.05$ was found between this ages group and 11, 12 years old. The means of 15 and 16 years old are 258.02 ± 57.78, 225.37 ± 48.67, respectively and significant difference $p < 0.05$ was found between 15 and 16 years old. The means of ARTs of 17 and 18 years old are 214.19 ± 40.43, 212.91 ± 49.31, respectively. As a result of the conducted statistical analysis, significant difference $p < 0.05$ was found between 16

and 15 years old, 17 and 15 years old, 18 and 15 years old. Many researchers have showed that reaction time differ according to the type of stimulant, required response type, age, gender, education level, training level, warm-up, fatigue level and environmental factors. Basing upon correlation between reaction time and age, while reaction time improve dramatically throughout puberty, reach the peak from 15 to 20 years old and it goes steady after this term (Oxendine, 1984). Hodgkings (1963) showed that reaction time reached the summit at 19 years old and it declined after 60 years old.

There are some determinants which effect on reaction time. These are attention, driving force (fighting spirit, ambition, enthusiasm, awards) and warm-up (Gündüz, 1995). According to the research conducted by Bompa (2007), reaction time of a subject group who do consistently exercise is 0.15-0.20 sc, which of untrained sedentary subjects group is 0.25-0.30 sc. When evaluated auditory, light and tactile reaction time in simple reaction time, reaction time to light is 180 ms, that of auditory is 140 ms and that of tactile is 140 ms (Singer, 1975).

The means of auditory reaction times of teenagers are that the means of ARTs of 11, 12 and 13 years old are 271.15 ± 63.28, 278.36 ± 58.75 and 246.40 ± 65.88, respectively. According to the conducted statistical analysis, significant difference $p < 0.05$ was found between 13 and 11, 13 and 12. The means of ARTs of 14 are 237.34 ± 52.61 and significant difference $p < 0.05$ was found between this ages group and 11, 12 years old. The means of s of 15 and 16 years old are 258.02 ± 57.78, 225.37 ± 48.67, respectively and significant difference $p < 0.05$ was found between 15 and 16 years old. The means of ARTs of 17 and 18 years old are 214.19 ± 40.43, 212.91 ± 49.31, respectively. As a result of the conducted statistical analysis, significant difference $p < 0.05$ was found between 16 and 15 years old, 17 and 15 years old, 18 and 15 years old. Schul split 240 healthy subjects into age groups and compared reaction times of them. 7-8 years old (871 ms), 9-10 years old (766 ms), 11-12 years old (743 ms), 13-14 years old (684 ms), 15-17 years old (591 ms) were found in terms of age and reaction time, respectively (Schull, 2003).

We assume that our research contributes to literature to detect auditory and visual reaction times of 11-18 years old youth. In conclusion, according to the results of our research, visual and auditory reaction times increase with 11-18 ages. Previous researches showed that the peak reaction time can be at 20 ages and after that reaction time decrease.

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