

## Peculiarities of using blood types serologic markers for the development of time perception function of young athletes aged 13-16

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### Abstract.

The article deals with influence of blood types serologic markers on development of psychological function of time perception of young athletes aged 13-16. Young teenage (n=139) athletes took part in the research. Based on classification by A.H. Dembo they were divided into two groups: group A – speed and power kinds of sports (n=74), group B – endurance kinds of sports (n=65). Control group consisted of students aged 13-16 (n=106) and students aged 18-21 (n=150) who did not practice sports. Analysis of time perception function was done by methods of V.L. Maryshuk in co-authorship, D. Zakay, R. A. Block's method being its prototype, which envisages defining an error of a time period definition via registration of a so-called coefficient of subjective evaluation of endurance. The fact of possible use of blood types in genetic prognostication of time perception development has been established. It has been revealed that people with B(III) blood type have better associative ties properties of the aforementioned function whereas it is still to be discovered who has the worst tie. Differences between characteristics of changes of time perception among teenagers who practiced sports have not been revealed.

**Key words:** psychological functions, time perception, research, young athletes, students of schools, students.

### Introduction

A number of research papers focused on influence of blood types serologic markers on development of certain motion [14, 15, 16] and psychological [6, 13] qualities of people of different age and profession indicate on the existing associative interrelation between blood types and development of the aforementioned features. According to authors, analysis of these interrelations can be used in practice of professional and sport selection of gifted youth.

Available references [3, 9, 10, 11] give us information about the influence of practicing various kinds of sports on person's time organization (time perception) as mental process of reflection of integral images, objects, or phenomena in mind with their immediate influence on organs of sense perception. Most of these researches are fragmentary and are related to individual specializations, namely: the object of research of works by G. Atkinson, L. Speirs [9] was tennis players; works by B. Dalton, L. McNaughton, B. Davoren [11] – cyclists etc.

As mentioned by Yu.V. Koryagina [3], information about regularities of time regulation of body functions (vital activity) allows revealing not only homeostatic mechanisms of person's adaption to sports trainings but also use in practical activity selection and orientation of gifted youth when choosing a kind of sport, and allows medical and biological control of the course of educational and training process. It is stipulated by the fact that chronobiological peculiarities of time and space perception are one of the leading factors that limit sports performance, i.e. a universal indicator of efficiency: the better time perception a person has, the more successful this person is [2, 3].

However, ideas of various researchers of influence of sports activity on peculiarities of time perception development are popular. Thus, Yu.V. Koryagina [3] concludes that the least error of individual time unit value in relation to astronomical minute is observed with athletes of cyclic kinds of sports, whose activity is not limited neither in space nor in time (according to the classification by A. H. Dembo [1] these include endurance kinds of sports), while the biggest error is observed with representatives of acyclic kinds of sports. It should be noted that the most stable (as mentioned by this author), in terms of actual time reflection, is the system of time perception of athletes practicing situational kinds of sports, whose activity is significantly limited both in time and space. Other researchers [5] note that the closest to actual countdown is individual perception of time spans among

athletes of martial arts (boxing, wrestling). It is related to the fact that duration of a single combat (for instance, a round in boxing) is defined by an athlete not with a timer (this being used by judges) but with personal sense ("inner clock"). We consider the fact of inherited conditionality of the index of various-duration time spans recreation defined by R. Soloshenko and D. Nedogonova [7] to be the most interesting within the context of the aforementioned. However, as noted by the researchers, this fact needs further research in this area with purpose of coming to a final conclusion.

Moreover, it should be noted that M.F. Khoroshukha [8] has discovered the fact of a specific influence of practice orientation based on peculiarities of mental functions of young athletes aged 13-16. Namely, it has been stated that improvement of time perception function is observed under influence of physical workload of speed and power character, while under the influence of endurance-character workload, insignificant changes of the indices of the aforementioned mental peculiarity are observed. Regarding the issue of influence of blood types serologic markers on the development of time perception function of teenage athletes practicing kinds of sports of various training orientation, it is still to be researched.

## Materials and methods

Young athletes (boys) aged 13-16 (n=139) from Brovary High College of Physical Culture (experimental group) took part in the research. They were divided into two groups based on the classification of kinds of sports by A.H. Dembo [1]: group A (n=74) – speed and power kinds of sports (boxing, wrestling); group B (n=65) – endurance kinds of sports (skiing, cycling). The control group was divided into two subgroups: subgroup 1 – students aged 13-16 from secondary school №3 in the town of Brovary who did not practice sports (n=106); subgroup 2 – students of 1<sup>st</sup> – 4<sup>th</sup> year of studies from National Pedagogical Dragomanov University, faculty of physical education and sports (n=150), who also did not practice sports.

Analysis of the function of time perception was done by the methods developed by V.L. Maryshchuk in co-authorship [4]. Its basic idea is as follows: by tapping a pencil on table, the person who runs the experiment starts countdown (in seconds) and finishes it with another tap. Another person must recreate this interval also by tapping a pencil on the table. Time spans ranged from 6 to 12 seconds. Every person was offered 10 attempts to do this test.

*Note.* A prototype of the aforementioned method is the method by D. Zakay, R. A. Block [17] that envisages defining an error of time perception via registration of a so-called coefficient of subjective evaluation of endurance as relation of subjective time duration evaluation to actual one.

The following indices were defined: scope of errors made by participants and accuracy of time perception. The letter index was defined using the the formula:

$$T = 100 - \frac{S_2 \times 100}{S_1}, \text{ in which}$$

T – accuracy of time interval evaluation, %;

S<sub>1</sub> – sum of time spans defined by the person running the experiment.

[*Note.* For all participants, this index was the same totaling 89 s, while constituent parts of this sum (time spans) were given in the following sequence: 8→11→6→10→7→12→6→9→9→11 s];

S<sub>2</sub> – sum of error made by a participant, s.

Testing was done in an isolated room before noon (from 9am to 12pm, least 2 hours after consuming foodstuffs). One-two days before the test, participants were asked to decrease volume and intensity of their physical workload by 50%, not to consume tonics and sedatives, and strong tea or coffee on the day of testing.

Information about blood types was taken from medical records of the participants. Persons who did not have information about their blood types were not allowed to participate in testing.

During the testing, true differences between people having different blood types of Rh factor who represented experimental group (young athletes) and control group (students of schools and universities) were defined via parametric Student's t-criterion.

Aim of the article is to analyze influence of blood types serologic markers on the development of time perception function of young athletes aged 13-16.

Methods of research: theoretical analyses and generalization of academic and methodological references, pedagogical survey, testing, statistics methods.

## Results

Data on associative tie of blood types with features of mental function of time perception of young athletes aged 13-16 without taking into account specific features of their kinds of sports are represented in table 1.

Table 1

**Indices of time perception function of young athletes aged 13-16 (without taking into account specific features of kinds of sports) having different blood types,  $X \pm m$ , (n=139)**

№	Blood types	n	Time perception	
			Sum of errors, s	Time perception accuracy, %
1	O(I)	46	4,6±0,26	94,8±0,29
2	A(II)	43	4,3±0,23	95,1±0,26
3	B(III)	28	3,9±0,27	95,6±0,30
4	AB(IV)	22	4,2±0,34	95,3±0,38
Difference adequacy		P1-P2	>0,05	>0,05
		P1-P3	>0,05	>0,05
		P1-P4	>0,05	>0,05
		P2-P3	>0,05	>0,05
		P2-P4	>0,05	>0,05
		P3-P4	>0,05	>0,05

Analysis of the data shown in this table revealed that the sum of errors in time span perception made by young athletes having different blood types and specializing in kinds of sports of different training orientation (power, speed, and endurance) were practically similar with most of them, which is why no statistically true differences have been revealed ( $P > 0,05$ ) among persons having the four blood types. However, tendency to decrease of this index with teenagers having B(III) blood type compared to the ones having O(I), A(II), and AB(IV) types should be noted. Thus, with persons having B(III) blood type, this index was  $3,9 \pm 0,27$  s, while with their peers having O(I) type it was  $4,6 \pm 0,26$  s, and with persons having A(II) and AB(IV) types –  $4,3 \pm 0,23$  and  $4,2 \pm 0,34$  s respectively. Along with peculiarities of changes of the index of sum of time errors, as expected, another index of this function, accuracy of time perception, also changed. Comparative analysis of average values of this index with athletes having different blood types also did not reveal significant differences ( $P > 0,05$  in all cases). In general, we may assume that young athletes having B(III) blood type had the best associative tie with the function of time perception.

Next two tables (table 2 and table 3) show data of comparative analysis of the indices of the function of time perception with young athletes specializing in kinds of sports with different training orientation based on the classification of kinds sports by A.H. Dembo [1] (group A – speed and power kinds of sports. Group B – endurance kinds of sports).

Table 2

**Indices of time perception function of young athletes aged 13-16 having different blood types,  $X \pm m$ , (n=74) and practicing speed and power qualities (group A)**

№	Blood types	n	Time perception	
			Sum of errors, s	Sum of errors, s
1	O(I)	24	3,8±0,28	95,8±0,31
2	A(II)	23	3,7±0,25	95,9±0,29
3	B(III)	15	3,3±0,34	96,3±0,39
4	AB(IV)	12	3,5±0,38	96,1±0,43
Difference adequacy		P1-P2	>0,05	>0,05
		P1-P3	>0,05	>0,05
		P1-P4	>0,05	>0,05
		P2-P3	>0,05	>0,05
		P2-P4	>0,05	>0,05
		P3-P4	>0,05	>0,05

Table 3

**Indices of time perception function of young athletes aged 13-16 having different blood types,  $X \pm m$ , (n=65) and practicing endurance quality (group B)**

№	Blood types	n	Time perception	
			Sum of errors, s	Sum of errors, s
1	O(I)	22	5,6±0,36	93,7±0,40
2	A(II)	20	5,1±0,34	94,3±0,38
3	B(III)	13	4,6±0,33	94,8±0,37
4	AB(IV)	10	5,1±0,46	94,3±0,52
Difference adequacy		P1-P2	>0,05	>0,05
		P1-P3	>0,05	>0,05
		P1-P4	>0,05	>0,05
		P2-P3	>0,05	>0,05
		P2-P4	>0,05	>0,05
		P3-P4	>0,05	>0,05

As seen here, we have not revealed statistically valid difference between the aforementioned (sum of errors and time perception accuracy) indices of the function of time perception with young athletes aged 13-16 ( $P>0,05$ ), some of whom primarily developed speed and power qualities (table 2), while others – endurance quality (table 3). However, athletes from both groups (A and B) having B(III) blood type showed a tendency to decrease of the index of sum of time span errors (with teenagers from group A average values of this index were  $3,3\pm 0,34$  s, group B -  $4,6\pm 0,33$  s).

Table 4 shows data of research of the function of time perception with students of schools aged 13-16 who did not practice sports (control group).

Table 4

**Indices of time perception function of students of schools aged 13-16 who do not practice sports and have different blood types,  $X\pm m$ , (n=106)**

№	Blood types	n	Time perception	
			Sum of errors, s	Sum of errors, s
1	O(I)	28	$5,4\pm 0,32$	$94,1\pm 0,35$
2	A(II)	30	$5,2\pm 0,26$	$94,5\pm 0,29$
3	B(III)	26	$4,2\pm 0,39$	$95,6\pm 0,42$
4	AB(IV)	22	$5,2\pm 0,30$	$94,5\pm 0,33$
Difference adequacy		P1-P2	$>0,05$	$>0,05$
		P1-P3	$<0,05$	$<0,05$
		P1-P4	$>0,05$	$>0,05$
		P2-P3	$<0,05$	$<0,05$
		P2-P4	$>0,05$	$>0,05$
		P3-P4	$>0,05$	$>0,05$

As seen from this table, students having B(III) blood type made fewer errors in time span perception compared to other students. Thus, analysis of changes of average values of the 'sum of errors' index shows statistically true improvement of this index with persons having B(III) blood type compared to the ones having O(I) type ( $4,2\pm 0,39$  s with students having B(III) blood type compared to  $5,4\pm 0,32$  s with persons having O(I) type;  $P<0,05$ ) and A(II) blood types ( $4,2\pm 0,39$  s compared to  $5,2\pm 0,26$  s respectively;  $P<0,05$ ). Despite the fact that no true differences have been revealed between values of this index with persons having B(III) and AB(IV) blood types ( $P>0,05$ ), a tendency to its improvement with persons having B(III) blood type compared to  $5,2\pm 0,30$  s of the ones having AB(IV) type respectively;  $t=2,03$  at  $P>0,05$ ) is observed.

A single-type change of the index of sum of time perception errors with students having different blood types is also noted with the index of accuracy of time perception. In all cases, average values of the letter index remain higher with persons having B (III) blood type.

It should also be mentioned that there are no true differences ( $P>0,05$ ) between the values of indices of time perception among persons having O(I), A(II), and AB(IV) blood types.

Our previous research papers [13] indicate that focus, stability, and concentration of the attention function only improves with time. Thus, in our case, we may assume that function of time perception, like function of attention, is also manifested better in young age rather than in teen age. Due to this, we have researched the issue of defining influence of blood type serologic markers on the development of the function of time perception with students aged 18-21 of higher educational establishments who do not practice sports. Data of this research is shown in table 5.

Table 5

**Indices of time perception function of students aged 18-21 who do not practice sports and have different blood types,  $X\pm m$ , (n=150)**

№	Blood types	n	Time perception	
			Sum of errors, s	Sum of errors, s
1	O(I)	40	$5,6\pm 0,44$	$93,7\pm 0,49$
2	A(II)	49	$5,7\pm 0,35$	$93,6\pm 0,39$
3	B(III)	35	$3,1\pm 0,30$	$96,5\pm 0,34$
4	AB(IV)	26	$5,7\pm 0,41$	$93,6\pm 0,47$
Difference adequacy		P1-P2	$>0,05$	$>0,05$
		P1-P3	$<0,001$	$<0,001$
		P1-P4	$>0,05$	$>0,05$
		P2-P3	$<0,001$	$<0,001$
		P2-P4	$>0,05$	$>0,05$
		P3-P4	$<0,001$	$<0,001$

As seen from table, by indices of sum of errors and accuracy of time perception, students having B(III) blood type have truly better values of the function of time perception compared to their peers having O(I), A(II), and AB(IV) blood types ( $P < 0,001$  in all cases). No statistically probable difference by all indices of the function of time perception between persons having O(I), A(II), and AB(IV) blood types ( $P > 0,05$ ) has been discovered. Thus, we may assume that persons having B(III) blood type have better associative ties with the function of time perception. We think that it is impossible to define the worst associative tie among persons having O(I), A(II), and AB(IV) blood types.

### Discussion

Analyzing changes of the aforementioned indices of the function of time perception depending on blood types serologic markers of Rh factor system with young athletes aged 13-16 (without taking into account orientation of their training process), it should be noted that genetic disposition to the development of this mental feature of students, similarly to previously studied function of attention by us [13] and L.P. Sergiyenko [6] exists. Thus, despite the fact that by all indices characterizing peculiarities of time perception, no probable differences between persons having O(I), A(II), B(III), and AB(IV) blood types ( $P > 0,05$ ) have been found; however, a tendency to decrease of the index of sum of errors in time spans perception with teenagers having B(III) blood type compared to other individuals is observed.

The same is observed with athletes having single-type (speed, power, or endurance) orientation of their training process. Thus, persons having B(III) blood type, some of whom primarily develop speed and power qualities (group A), while others – endurance quality (group B), have a tendency to decrease of the index of sum of time spans errors. In general, it leads us to the belief, that young athletes having B(III) blood type may have the best associative tie with peculiarities of time perception. However, the fact that athletes having different orientation of training process (according to the classification of kinds of sports by A.H. Dembo) did not show true differences in indices of the aforementioned mental function ( $P > 0,05$ ), is another proof of a specific influence of physical workload on functions of human body of different age and profession [1, 8, 12 et al.].

The best associative tie with peculiarities of time perception being peculiar to individuals having B(III) blood type is proved by data of control group analysis (students who do not practice sports). The research of the control group shows that truly better values of indices of time perception function are observed with individuals having B(III) blood type compared to their peers having O(I) and A(II) types ( $P < 0,05$  in both cases), and much better, though not proven, average values of indices of this function compared to individuals having AB(IV) blood type.

Finally, multi-year analysis of students from National Pedagogical Dragomanov University, faculty of physical education and sports, prove that the best associative tie with peculiarities of time perception is peculiar to persons having B(III), while the worst tie is still to be analyzed. We may also assume that peculiarities of time perception as well as other mental functions are better manifested in young age rather than in teen age.

### Conclusions

We assume application of blood types serologic markers with Rh factor system to be possible in genetic prognostication of the development of time perception ability of teenage athletes, their peers (students who do not practice sports), and other students. In general, based on the results of multi-year analyses, we conclude that persons having B(III) blood type possess the best associative ties with peculiarities of time perception, while the worst tie is still to be revealed.

**Conflicts of interest.** The authors report no conflicts of interest.

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