

Psychophysiological singularities of children development in rural areas

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Abstract. The article deals with psychophysiological development singularities of children and teenagers of 7-15 years of age living in the rural area of the Pavlodar Region. The following methodology was used for the research: determination of short-term mechanical memory using numerical rows; determination of short-term semantic memory; determination of logical memory using meaning-bearing phrases of various length; determination of mental capacity using correction test; determination of trait anxiety (C.D. Spilberger & Y.L. Khanin); diagnostics of the level of anxiety at school (Phillips' methodology). Analysis of the obtained data gave reasons to conclude that rural girls were ahead of their peers by the index of mental capacity. The article proves based on data obtained in the result of the experiment that rural schoolchildren are in the state of moderate anxiety (at that, girls have somewhat higher anxiety than boys do), and that the volumes of verbally logical and mechanical memory increase over age.

[Mukatayeva Zh. M. **Psychophysiological singularities of children development in rural areas.** *Life Sci J* 2014;11(11s):255-257] (ISSN:1097-8135). <http://www.lifesciencesite.com>. 58

Keywords: Psychophysiological singularities of development, short-term mechanical memory, social-environmental ill-being, mental capacity, personal anxiety, memory volume

Introduction

At the same time, as the science develops, it becomes more and more obvious that health is one of the most integral, complicated and complex processes. During recent years, the problem of school-age children's health has drastically worsened, the morpho-functional and psychophysiological status of children has notably deteriorated, which is commonly associated with the increased social-environmental ill-being [1]. The Pavlodar Region is a large industrial center of Kazakhstan having a developed industry, which results in high pollution of air, soil, and snow cover. It is a known fact that children are the most sensitive contingent to the impact of adverse environmental factors.

Deterioration of the health of school-age children is also determined by the increasing study load, inconsistency of the volume and content of the learning materials with the age-specific features. The first attribute of somatic deviations are the signs of emotional stress and continuing anxiety. Taking into account the fact that a certain part of the population of the Pavlodar Region resides in rural area as well as its disadvantageous medical demographic indicators, we undertook a research of morpho-functional and psychophysiological indicators of the 7-15 year-old children's health. This article contains a psychophysiological research.

The objective of the article is to study psychophysiological development singularities of children and teenagers of 7-15 years of age living in the rural area of the Pavlodar Region. 354 schoolchildren took part in the research including

169 boys and 185 girls. All children were broken up into groups by age and sex. The age was determined according to commonly accepted standards.

Methodology

The psychophysiological indicators were studied by the procedure [2]: determination of short-term mechanical memory using numerical rows; determination of short-term semantic (verbal and logic) memory; determination of logical memory using meaning-bearing phrases of various length; determination of mental capacity using correction test; determination of personal anxiety (C.D. Spilberger & Y.L. Khanin); diagnostics of the level of anxiety at school (Phillips' methodology).

All the results were processed by the analysis of variance procedure using the Student's t-criterion. Differences of average values were considered significant at $p < 0.05$ [3].

Results and discussion of them

Mental capacity – a derivative from attention focusing – improves over age. Attentional capacity, speed of work fulfillment, and performance (quality) also improve [4, 5, 6, 7, 8, 9, 10]. The index of general attention grows, in which the speed and performance complement each other, and the number of mistakes decreases. The longitudinal analysis of the research of mental capacity values of rural children is shown in Table 1. Over age, the scope of work fulfilled by rural schoolchildren increases, the number of mistakes per 500 characters decreases and the performance ratio grows. The table shows that rural girls of 9-15 years of age demonstrate greater

volume of fulfilled work than boys did; the statistical significance was revealed at the age of 13-15 years.

Table 1. Average values of mental capacity indexes of rural schoolchildren of 7-15 years of age

Age	No.		Scope of work	No. of mistakes per 500 characters	Ratio of efficiency	Ratio of mobility
7	15	m	130.0±9.2	29.0±4.2	1.1±0.1	
	18	f	125±12.2	17.2±4.4*	1.5±0.2*	
8	17	m	148±13.6	22.2±4.3	1.6±0.2	
	20	f	148±14.3	13.7±1.8	2.1±0.3	
9	15	m	239±25.4	21.8±3.5	2.5±0.2	2.2±0.1
	20	f	272±59.0	12.7±3.8	4.3±1.1	1.4±0.1*
10	23	m	328±15.0	17.4±5.9	4.5±0.4	1.7±0.1
	23	f	369±19.0	12.6±1.9	5.0±0.4*	1.6±0.1
11	20	m	398±22.9	16.0±2.9	5.2±0.6	1.7±0.1
	20	f	419±28.3	11.3±1.8	6.0±0.7	1.6±0.1
12	19	m	442±46.4	15.8±2.2	5.6±0.5	1.9±0.2
	19	f	486±20.8	10.2±1.2*	7.1±0.5*	1.6±0.1
13	20	m	451±21.2	15.2±1.8	5.9±0.5	1.9±0.2
	20	f	521±15.6*	9.4±2.1*	8.1±0.5*	1.6±0.1
14	25	m	466±26.7	15.1±2.0	6.2±0.4	2.0±0.2
	25	f	578±36.3*	8.7±1.1*	9.1±1.1*	1.6±0.1*
15	17	m	470±31.6	14.2±3.6	6.8±0.7	1.8±0.1
	20	f	592±33.6*	7.6±3.0	10.6±0.7*	1.5±0.1*

Remarks: * statistically significant differences of average values between the sexes, at p<0.05.

The number of mistakes committed by girls of all age groups is lower if compared to those made by boys; statistically significant differences were observed at the age of 12-14 years. By the performance ratio, statistically significant differences were revealed with 12-14 year-old girls; at that, the performance of girls was higher at all times.

Table 2. Anxiety values of rural schoolchildren

Age	No.	Sex	LA (Silberger&Khanin)	Schoolchildren's anxiety according to Phillips methodology
9	13	m		35.5±0.6
	20	f		37.5±1.4
10	23	m		37.3±1.7
	23	f		39.6±1.6
11	20	m	42.3±0.9	34.9±1.3
	20	f	45.5±1.1*	37.4±2.4
12	19	m	40.9±0.9	32.4±2.1
	19	f	44.5±1.1*	32.9±2.5
13	20	m	40.3±0.6	33.3±2.0
	20	f	39.2±1.1	39.8±2.1*
14	25	m	40.4±0.7	36.9±1.8
	25	f	41.6±1.3	40.4±1.4
15	17	m	37.6±1.0	42.0±2.5
	20	f	41.7±1.0*	44.0±1.5

Remarks: * statistically significant differences of average values between the sexes, at p<0.05.

Thus, rural girls were ahead of their peers by the indexes of mental capacity.

At studying the level of anxiety by the questionnaire of C.D. Spilberger & Y.L. Khanin, it was revealed that rural schoolchildren were in the state of moderate anxiety (Table 2). These studies demonstrated gentle decrease of the level of anxiety of 11-15 year-old boys, which correlates with literature sources data. Trait anxiety of girls shows tendency to decrease until they reach the age of 14 years, upon which moderate growth is observed. The level of trait anxiety of girls at all ages, except for

the age of 13 years, was always higher than the level of boys' anxiety.

The Phillips' questionnaire of anxiety at school is one of standard psychophysiological diagnostic tools that allows estimating not only the general level of anxiety at school, but also the qualitative uniqueness of anxiety experiencing related to various spheres of school life. In our researches, the values of the indicators do not exceed the 50% margin, which means moderate anxiety. The values of indicators of rural girls' anxiety at school are higher than their peers' values (Table 2). The growth of the girls' anxiety at school is caused by higher responsibility with respect to the school activity, difficulties of the age of adolescence, and intra-school interactions. The data of the anxiety level study indicate that the children examined by the both first and second methods were in the state of moderate anxiety, which requires psychological correction.

The study of the memory volume of rural schoolchildren evidences that the values of short-term (verbal and logical) memory grow over age. The verbal and logical memory of girls improves more intensively at the age of 12-15 years than the memory of their peers (Figure 1).

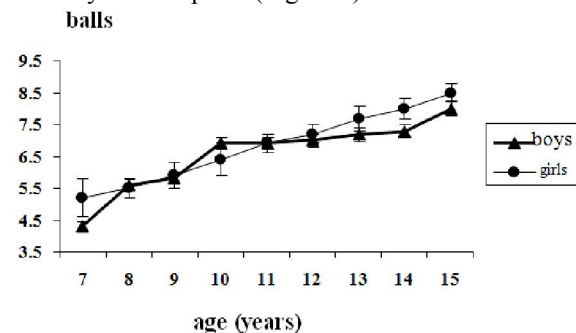


Figure 1. Change of the level of verbal and logical memory over age

Remarks: * - statistically significant differences of average values between the sexes, at p<0.05.

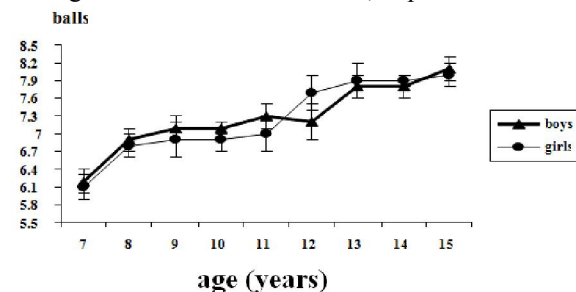


Figure 2. Longitudinal change of the short-term mechanical memory of rural schoolchildren

Remarks: * - statistically significant differences of average values between the sexes, at p<0.05.

At the study of the volume of mechanical memory, higher values were revealed with boys of 7-11 years of age, then starting from 12 and until 15 years of age, a faster growth rate is shown by the girls' mechanical memory (Figure 2).

Development of children's memory improves in the course of teaching and parenting; at that, one needs to take into account the individual singularities of a child and know the mechanisms of possible disorders and methods of their correction.

Conclusions

1. Longitudinal mental capacity of rural schoolchildren increased by all indicators, but girls showed higher values.

2. Rural schoolchildren are in the state of moderate anxiety, and the level of girls' anxiety is higher than the one of boys.

3. Volumes of verbal and logical mechanical memory of schoolchildren increase over age; girls of 12-15 years of age are ahead of their peers by the level of memory.

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7/1/2014