

**SHORT-TERM VISUAL MEMORY PROPERTIES SHEET SECONDARY SCHOOL AGE WITH
DIFFERENT LEVELS OF PHYSICAL DEVELOPMENT**

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Annotation. *Purpose.* The results presented properties of short-term visual memory with different levels of physical development. *Materials and methods.* The study included 405 boys and girls Cherkassy school 11 in age from 13 to 16 years. Study of short-term visual memory was carried out using tables with 10 characters (numbers and ambiguous geometric shapes). Indicator memory was the higher, the more information was displayed. Measured the length and body weight was recorded cardiorespiratory indicators - heart rate at rest and after 20 squats, lung capacity, breath-hold inspiration and expiration. Physical development factor was calculated by taking into account actual and average population indices. *Results.* Found that the volume of short-term visual memory, the boys and girls high school age does not depend on the level of their physical development. Despite the fact that the trend towards higher performance memory in groups of persons with a high level of physical development compared to their same age with medium and low levels, significant differences between the mean values for the most part have been identified. No significant differences between the values of the investigated cognitive function in groups by sex. *Conclusions.* Growth pattern memory with age in this period of ontogenesis preserved that coincides with the data presented in the scientific works of scientists.

Keywords: visual, memory, physical, development, schoolchild.

Introduction

The importance of studying formation regularities of memory and attention function properties in ontogenesis is stipulated by the fact that these psychological characteristics of a child, adolescent and youth are essential for education and training. Memory is a fundamental psychological characteristic of a person that mostly determines personal features being formed in the period of ontogenesis [3, 8]. The physiological basis of memory is the formation of temporal nervous connections in the cortex which may be retained and actualized in the future under the influence of different irritants. Memorization has a leading role in memory processes affecting the completeness, accuracy of material reproduction and the strength and duration of its storage. Studying the memory properties in the ontogenesis, researchers observed its intensive growth at the age of 2-17 [2]. The deceleration of memorization growth was found at the age of 13-15 which is explained by the authors with the unbalance of nervous processes, the dominant effect of excitation at this age, its wide generalization, and significant loss of efficiency of cortex nerve cells. Studying the correlation of the properties of main nervous processes and memory among junior and senior schoolchildren, students and adults, the researchers stress that further growth of the properties of all functions occurs, the correlation between the efficiency of short-term visual memory and the properties of the main nervous processes is gradually adjusted, and the dependency of memory individual peculiarities from typological properties of higher nervous activity (HNA) is found [Ошибка! Источник ссылки не найден., 9, 10].

The analysis of scientific sources shows the correlation of memory with the properties of nervous processes in human ontogenesis; however, the problem of memory correlation with the physical development of children and adolescents in the age aspect is not investigated and is interesting from research point of view. The work is performed according to the research plan of Cherkasy B. Khmelnytsky National University.

Purpose, tasks of the work, material and methods

The purpose of the presented work is to investigate the properties of short-term visual memory of senior schoolchildren with the different level of physical development.

Research organization and methods. 405 boys and girls aged 13-16 in Cherkasy secondary school №11 were investigated. Short-term memory was studied using tables with 10 symbols (two-digit numbers and geometric shapes). The investigated persons reproduced the material in writing in no particular order after 30-seconds memorizing and setting aside.

Research results.

The increase of memory amount indexes is observed at the age of 13-16 on the background of gradual growth of separate features of physical development; it is associated with the change of pupils' age. Such reasoning is confirmed by many scientific studies [1, 6]. The tendency of pupils with high level of physical development to have higher indexes of memory for numbers than their peers with middle and low level of physical development is found. However, reliable differences between average values in the investigated groups are not found ($p > 0.05$). Demonstrated facts show that the pupils aged 13 memorize the least information with the lowest memory amount; the pupils aged 16 reproduce the most information with higher values (Fig.1).

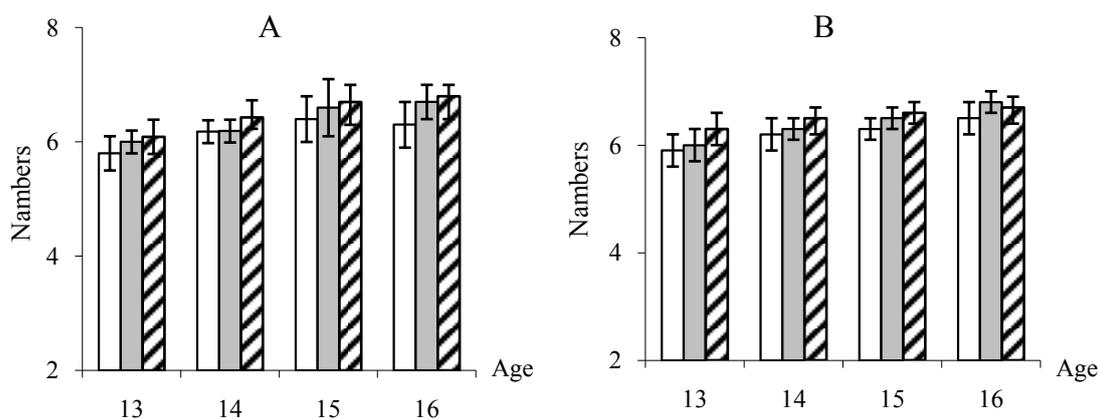


Fig.1. Short-Term Memory Amount for Numbers among Boys (A) and Girls (B) Aged 13-16 with
 □ - High, ■ - Middle, ▨ - Low Level of Physical Development

Boys and girls aged 13 with high level of physical development have the least number of memorized numbers according to which short-term visual memory amount is determined - 6.0 ± 0.3 signs and 6.3 ± 0.3 signs respectively; these values increase at the age of 16 - 6.8 ± 0.2 signs among boys and 6.7 ± 0.2 signs among girls. However, such improvement by 13.3% among boys and 6.3% among girls is not reliable and does not correspond the reliable level ($p > 0.05$). The reliable differences between investigated age groups according to short-term memory amount for numbers are not found among both boys and girls ($p > 0.05$). The investigated persons with the middle level of physical development have slightly lower memory amount for numbers than the pupils with high level of physical development. The age dynamics of changes in the investigated indexes is the similar for the persons with its high level of development. Thus, these values at the age of 13 are 6.0 ± 0.2 signs among boys and 6.0 ± 0.3 among girls. The boys and girls aged 16 have the highest indexes of memory amount for numbers; they reproduce 6.7 ± 0.2 i 6.8 ± 0.2 signs on the average. The values of memory amount for numbers at the age of 13-16 change by 11.6% among boys and 13.3% among girls ($P < 0.05$). Analogical tendency is found among the investigated persons with low, middle and high level of physical development; however, absolute values are lower in the first group. Thus, the smallest values of memory amount for numbers are found among the pupils aged 13: 5.8 ± 0.3 signs among boys and 5.9 ± 0.3 signs among girls. The pupils aged 16 have the highest indexes of memory amount for numbers: 6.3 ± 0.4 signs among boys and 6.5 ± 0.3 among girls. The indexes of memory amount for numbers change by 8.61% among boys ($p > 0.05$) and 10.1% among girls ($p < 0.05$). The reliable differences according to memory amount for numbers are not found among boys and girls with low level of physical development ($p > 0.05$).

Thus, short-term memory amount for numbers in the groups with different level of physical development does not differ significantly as well as according to gender features. Age dynamics of memory formation is clearly determined irrespective of the level of pupils' physical development.

The age dynamics of short-term memory for figures has the similar character as during memorizing previous material. The period of the age 13-16 is characterized with gradual increase of memory amount for figures. The lowest average values are found among the pupils aged 13; the highest ones - among boys and girls aged 16 (Fig.2).

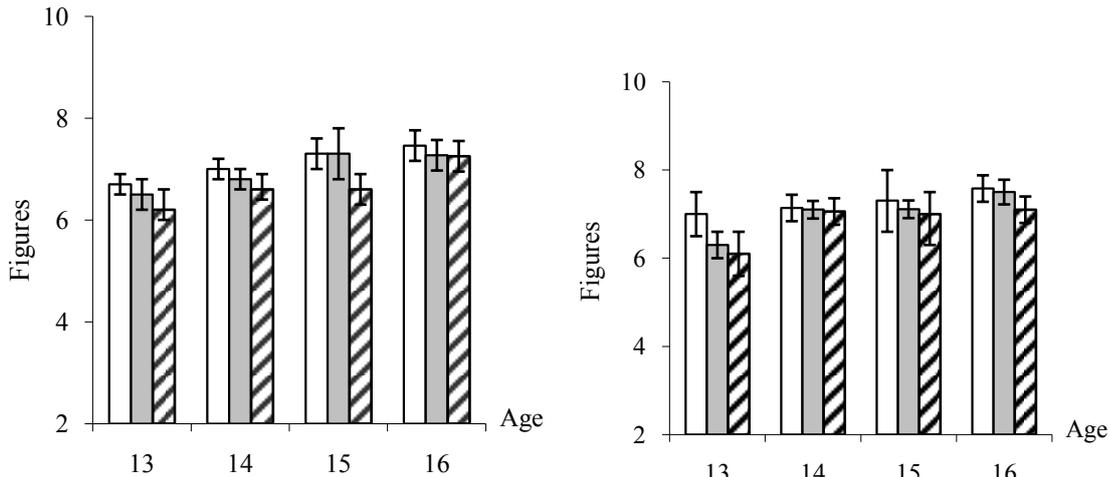


Fig.2. Amount of Short-Term Memory for Figures among Boys (A) and Girls (B) Aged 13-16 with
□ - High, ■ - Middle, ▨ - Low Level of Physical Development

* - the reliability of differences between high and low level of physical development $p < 0.05$

According to the data of the picture, the average values of memory amount for figures in the groups of girls and boys with high, middle and low level of physical development are found to be similar; although they tend to increase with age. The tendency of the girls and boys with the high level of physical development to be characterized with slightly higher indexes of memory amount than the pupils with middle and low level is observed. However, reliable differences are found among the boys aged 15 only between high and low level of physical development ($p < 0.05$). Thus, the pupils aged 13 with the high level of physical development have the least values of memory amount: 6.7 ± 0.2 signs among the boys and 7.0 ± 0.5 signs among the girls; they increase to 7.4 ± 0.3 and 7.5 ± 0.3 signs respectively at the age of 16. The memory amount for geometrical figures changes by 10.4 % among the boys ($p < 0.05$) and 7.1 % among the girls ($p > 0.05$) at the age of 13-16.

The memory amount for geometrical figures increases among the individuals with the middle level of physical development. The lowest values are found among the pupils aged 13: 6.5 ± 0.3 signs among the boys and 6.3 ± 0.3 among the girls. The highest indexes are found among the boys and girls aged 16; they reproduce 7.2 ± 0.3 signs and 7.5 ± 0.2 signs on the average. The average values of the memory amount for figures increase by 10.7 % ($p > 0.05$) among the boys and 19% among the girls ($p < 0.05$) at the investigated age. The differences reliability of the average values of the memory amount for figures is found only among the girls at the age of 13 and 14, 13 and 15, 13 and 16 ($p < 0.05$).

The least memory amount for figures is found among the investigated individuals with low level of physical development. Thus, it amounts 6.2 ± 0.4 signs among the boys aged 13 and 6.1 ± 0.5 signs among the girls of the same age. The increase of memory amount is 16% among the boys ($p < 0.05$) and 18% among the girls ($p > 0.05$). The correlation analysis of amount indexes of short-term visual memory for different material and physical development coefficient shows the correlation between them only among the boys aged 15 for figures ($r = 0.31$; $p < 0.05$). Correlation coefficients among the girls change unevenly and vary within $r = 0.01 - 0.29$ ($p > 0.05$) (Table 1, Fig. 3).

Table 1

Correlation Indexes of Physical Development Coefficient with Amount of Short-Term Visual Memory for Numbers and Figures

Indexes	Age Groups (years of age)			
	13	14	15	16
	Boys			
Numbers	0,14 > 0,05	0,21 > 0,05	0,04 > 0,05	0,18 > 0,05
Figures	- 0,12 > 0,05	- 0,01 > 0,05	-0,31 < 0,05	- 0,14 > 0,05
Girls				
Numbers	0,27 > 0,05	0,01 > 0,05	0,29 > 0,05	-0,13 > 0,05
Figures	- 0,02 > 0,05	- 0,26 > 0,05	- 0,17 > 0,05	- 0,05 > 0,05

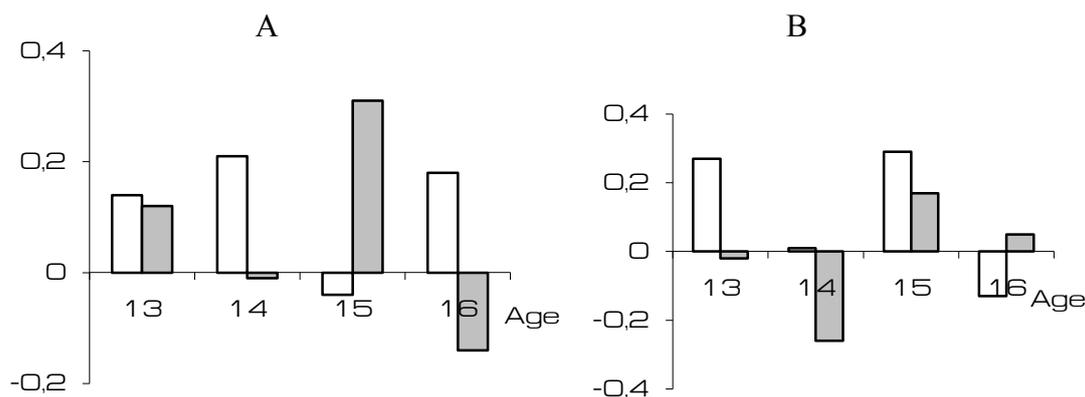


Fig. 3. Correlation between Physical Development Coefficient and Amount of Short-Term Memory for \square - Numbers, \blacksquare - Figures among Boys (A) and Girls (B) Aged 13-16

Conclusions.

Thus, the obtained data help to make certain conclusions: the development of such cognitive function as the amount of short-term visual memory among senior boys and girls does not depend upon the level of their physical development. Despite the tendency to higher indexes of memory amount in the groups of individuals with the high level of physical development, the reliable differences between average values are not found if compared with their coevals with middle and low level. The reliable differences are not found either between the values of investigated cognitive function in the groups according to gender features. The regularity of memory amount increase is retained in this period of ontogenesis with age that coincides with the data presented in the works of scientists.

Further research perspectives. The study of correlation between short-term visual memory and physical development using other methods.

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