

Comparative Study of Indicators of Mental Development of Primary School Children Living in Mountainous, Foothill and Coastal Areas

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Abstract. The presented article considers a comparative analysis of the results of the study of the influence of relief, climate and other factors on the mental development of primary school students in highland, foothill and coastal areas. Thus, a total of 164 primary school students from different regions aged 6-10 years were examined. The adaptation of primary school students is mainly influenced by indicators of mental development. From this point of view, the goal was to determine the formation of higher nervous activity, the period of transition to adolescence and normal individual mental development against the background of emerging neuroendocrine changes, conducting a study by testing primary school students living in areas with different relief (mountain, foothill and coastal), without causing emotional stress. The studies were conducted in Guba, Gusar, Khachmaz, Siyazan and Baku. As a result of the study, it was revealed that primary school students living in mountainous areas have a more stable nervous system. Thus, it was established that primary school children living in areas with different relief and climate have normal neuropsychic development. Baku school children had a higher level of individual anxiety than their peers. Primary school children living in mountainous, foothill and coastal areas have anxiety indicators within the normal range, indicating that they are more emotionally stable. At the same time, a stronger development of the sensory system and, as a result, a higher level of visual memory were recorded. It was established that primary school children living in highland areas have a high level of adaptation processes, the nervous system develops more stably and stress-resistant than their peers living in other areas.

Keywords: mountainous, foothill and coastal territories, younger schoolchildren, situational anxiety, individual anxiety, short-term memory, visual memory, auditory memory, attention.

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1 Introduction

The 21st Century is considered the century of technology, computerization and moral values. From this point of view, education occupies a very large and important place in our lives. There is a need for new research on the role of education in human life, as well as the impact of the duration of the educational process on human psychology. To conduct these studies more accurately, one of the main issues is a detailed study of the age periods that form the basis of developmental psychophysiology and age-related psychophysiology, and the psychoemotional situations encountered in them at school age. In particular, the study of the development levels of psychological and cognitive processes without the influence of emotional stress is one of the factors of successful learning. There are many factors that affect mental development indicators. So, in addition to the hereditary and genetic indicators of schoolchildren, there are numerous studies of the influence of environmental, social, terrain and climatic conditions, humidity and other environmental factors on mental and physical development [7-9].

School age is from 6 to 17 years old. This age range is considered a very important period in children's lives. The changes in both mental and physical development are obvious. School age is divided into two: junior school and senior school. Primary school period (6-10 years) is considered the initial period in a child's life. When they get into a new environment, i.e. a school environment, radical changes take place in their lives. The emergence of a new social role, a change in the main activity, the emergence of new social relationships and responsibilities, a new role model in their lives, etc. each affects the child's development. All this can also affect the emotional sphere of children. They show anxiety, shyness, aggressiveness, and tension to a certain extent, and this affects the adaptation process. If children are mentally healthy, adaptation is faster and easier. If they had any kind of mental disorder in earlier years or it is still ongoing, the symptoms may be more noticeable during the adaptation process. And this can slow down adaptation and cause certain obstacles [8,12].

Mental development indicators have a great influence on the adaptation of younger school children. From this point of view, the goal is to determine the formation of higher nervous activity, the period of transition to adolescence and normal individual mental development against the background of emerging neuroendocrine changes, by conducting research in younger schoolchildren living in territories with different terrain (mountainous, foothill and coastal), without causing emotional stress. The research was conducted on a voluntary basis among younger schoolchildren of Guba (Khaltan Village), Gusar Town, Khachmaz Town, Siyazan (Balaja Hamya Village) and Baku City.

First of all, it would be appropriate to provide information about the geographical location and topography of the studied territories.

Guba district is located on the north-eastern slopes of the Shahdag of the Greater Caucasus, at an altitude of 600 meters above sea level, on the shore of Gudyalchay. It is located on the north-eastern slopes of the Greater Caucasus, between the watershed of the Main Caucasian Ridge and the Samur-Davachi Plain. The terrain of the region consists of sloping plains, medium- and high-altitude areas. The Gusar Slope Plain and the Samur-Davachi Lowland are located in the north-eastern part. The southwestern border runs along the watershed of the Main Caucasian Ridge. Parallel to the Main Caucasian Ridge, it extends to the Side Ridge. Here, Yarimsa, Yerfi, Mikhtokan and Tanga ridges are separated in the form of arms. The peaks of Gizilgaya (3726 m), Babadag (3629 m), Shahnazar (2874 m) rise in the area. According to the geological age, Jurassic, Cretaceous, Neogene and anthropogenic deposits are widespread. The highlands are dominated by a cold and mountainous tundra climate. The average temperature in January is from -2°C to -14°C, in July from 5 °C to 23 °C. Annual precipitation increases from 500 mm to 900 mm from the plains to the mountains, most of which falls in autumn. The Gudyal, Garachay and Valvala

rivers flowing through the region belong to the basin of the Caspian Sea. Peat and grassy mountain meadow, brown forest and brown mountain forest soils are mainly distributed. In mountainous areas, alpine and subalpine meadows occupy a large area, and below there are broad-leaved mountain forests with a predominance of hazelnuts, nuts and oak. The village of Khaltan is one of the largest villages located in the mountainous area [17].

Gusar is a town in the north of Azerbaijan, the administrative center of the Gusar District. In 1938, the district received the status of a city subordinate district. It is located at the foot of the Greater Caucasus Mountains, on the Gusar River. The district center is located at an altitude of 690-730 meters above sea level. 4 of the 9 climate types of Azerbaijan are located in the Gusar region. The climate is moderately hot in the plains and foothills, cold and humid in the highlands. The average temperature in January is 1 °C on the plain, -14 °C in the highlands, 24 and 2 °C in July, respectively. The annual rainfall is 350-1500 mm [18].

Khachmaz District is located in the northeastern part of Azerbaijan. A part of the Samur-Davachi lowland belongs to the territory of this district. Khachmaz district borders the Russian Federation in the north, Gusar and Gubkin districts in the west, Shabran district in the south and the Caspian Sea in the east. 20.8 thousand hectares of the region's territory are covered with forests. The soil is meadow-forest, chestnut and light chestnut. Grasses and shrubs are widespread. There are also lowland forests. There are sources of thermal and mineral water. Khachmaz Town, located in the coastal zone, is characterized by densely populated, moderate hot semi-desert with arid summers and a dry desert climate. The average temperature in January is 1-2 °C, in July 23-24 °C. The annual rainfall is 300-400 mm [20].

Siyazan District is located in the north of Azerbaijan, on the Samur-Davachi plain, which is located on the coast of the Caspian Mountains and the mountains of the Greater Caucasus. In the south-east of the lowland, a semi-desert landscape is characteristic, and in the foothills, there is a forest-meadow landscape with gray-meadow, chestnut-brown, partly chernozems. The territory is dominated by oil and natural gas, as well as limestone, gravel, clay, etc. It is rich in natural resources. The district has a semi-arid and dry desert climate. The Ata-chay and Gil-Gilchay rivers, which run through the district, are fed by rain and partly snow waters originating from mountainous areas. Siyazan District is located in the northern zone of Azerbaijan, 100 km from Baku, the capital of the Republic of Azerbaijan, on the coast of the Caspian Sea and borders on both sides with the Khizi and Davachi districts [19]. The research was conducted in the area of Balaja Hamya Village.

Baku is located in the west of the Caspian Sea, in the south of the Absheron Peninsula, at the intersection of the meridians of longitude 40', 23' and 49', 51'. The Absheron Peninsula, on which Baku is located, is an area with a high average annual temperature and low rainfall. The average annual temperature in Baku is 14.4 degrees. Absheron ranks first in the Caucasus in terms of the number of clear, less cloudy days and last in terms of precipitation. The climate of Baku is semi-arid and subtropical. The long summer, which begins from early May to mid-September, is dry and hot. In the hottest months - July and August - the average daytime temperature is 26 degrees. In autumn, the summer heat subsides and is replaced by dry, mild, pleasant weather. Baku has a mild winter, so the average temperature in January is 3-5 degrees. Winter usually consists of less sunny days without snow and frost. Despite this, there is a strong north wind, sometimes even with small air changes, and these winds are the most important element of Baku. The most densely populated place in Azerbaijan belongs to Baku. So, the places where the research was conducted have different climates and topography. We have applied various testing methods to study the mental development of younger schoolchildren under the influence of environmental factors in these diverse geographical regions [16].

The Object of the Study: Not specially selected, practically healthy schoolchildren aged 6-10 years of both sexes (Guba-28 persons; Gusar-31 persons; Khachmaz-36 persons;

Siyazan-29 persons; Baku-40 persons), who voluntarily took part in the research testing process.

2 Research Methods

1. Situational and individual anxiety according to the Spielberger-Khanin Test;
2. Hamilton Anxiety Assessment Scale (HAM-A);
3. Determination of the level of short-term memory using the “Memory by Numbers” Test;
4. Determining the level of visual memory using the “Image Memory” Test;
5. Determination of the level of auditory memory using the Luria Test “10 Words”;
6. Determining the level of attention using the “Missing Detail” Test.

3 Results and Discussion

Initially, the psychoemotional state of younger schoolchildren was studied by researching psychological anxiety indicators. Thus, the level of situational and individual excitement of younger schoolchildren was determined using the Spielberger-Hanin Test. Thus, it was found that situational anxiety in schoolchildren of Guba is 31.5 points, and individual anxiety is 36.2 points; in schoolchildren of Gusar, situational anxiety is 34.2 points and individual anxiety is 35.5 points; in schoolchildren of Khachmaz, situational anxiety is 35.2 points, individual anxiety is 37.9 points; in schoolchildren of Siyazan the situational anxiety is 37.2 points, individual anxiety is 37.6 points; Baku schoolchildren have situational anxiety of 40.3 points, and individual anxiety of 47.8 points. When comparing the results of the Spielberger-Khanin Test with the norm, it was found that the average level of situational anxiety in all younger schoolchildren, and the individual anxiety of other schoolchildren, with the exception of Baku schoolchildren, is also at an average level. Only the individual excitement of the Baku schoolchildren was at a high level (Fig.1).

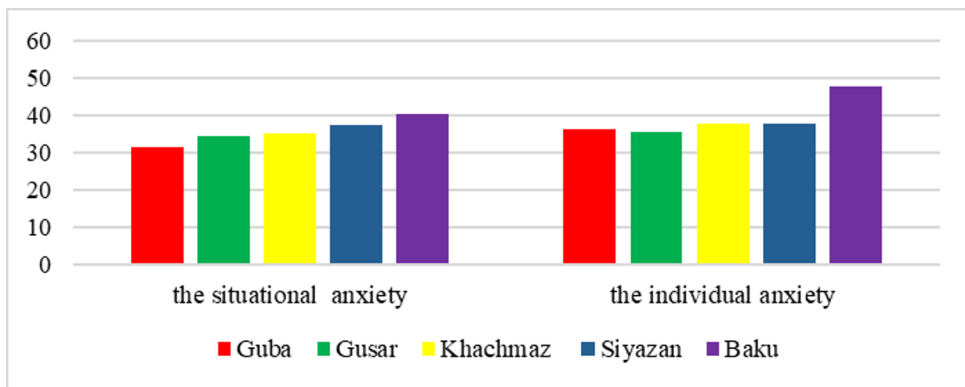


Fig. 1. The Results of Situational and Individual Anxiety of Younger Schoolchildren (according to the Spielberger-Khanin Test, with scores).

According to the results of assessing the level of anxiety by the Hamilton Scale, the level of excitement among Guba schoolchildren is 5.8 points; 5.2 points in Gusar schoolchildren; 5.9 points in Khachmaz schoolchildren; 6.1 points in Siyazan schoolchildren; 8.1 points in Baku schoolchildren. On the Hamilton Scale, scores from 0 to 8 indicate a low or moderate level of anxiety (Fig.2). The figures we have obtained in this limit prove once again that the psycho-emotional state of all schoolchildren is normal, there are no neuropsychiatric diseases, they have a normal emotional and evaluative ability [7,11,21,22].

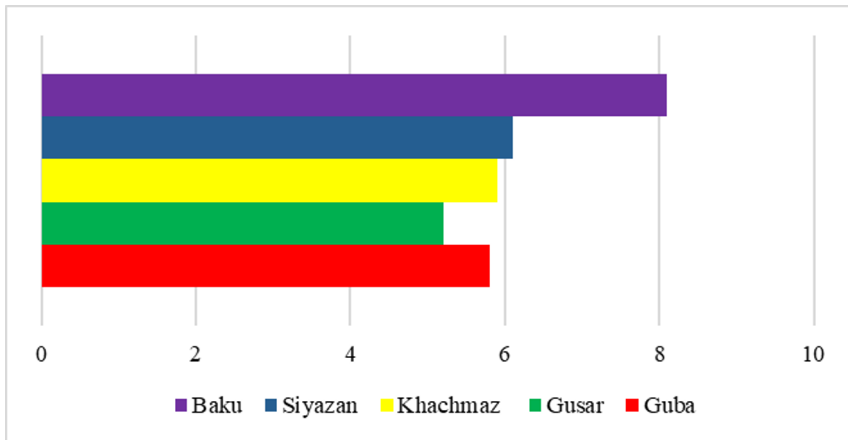


Fig. 2. Hamilton Scale Results for Younger School Children.

One of the most important indicators of mental development is the normal development of memory and attention processes [8,14]. For the purpose of a comprehensive assessment of memory processes, short-term memory, visual and auditory memory were studied. Thus, the short-term memory of Guba schoolchildren is 7.3 points, visual memory is 12.5 points, auditory memory is 7.9 points; Gusar schoolchildren have short-term memory - 7.1 points, visual - 11.2 points, auditory - 7.2 points; Khachmaz schoolchildren have short-term memory - 7.0 points, visual - 10.3 points, auditory - 7.4 points; Siyazan schoolchildren have short-term memory - 7.2 points, visual - 11.9 points, auditory - 7.1 points; Baku schoolchildren have short-term memory - 7.9 points, visual memory - 11.8 points, auditory - 8.3 points (Fig.3). During the analysis of the results obtained, it was found that all three types of memory indicators are within the normal range. In particular, in schoolchildren living in mountainous areas, compared with other peers, visual memory, which is a more active indicator of the sensory system, is many times higher than normal and 48% higher than normal, once again shows the positive impact of mountainous areas on the development of the sensory system. The normal development of memory processes, depending on age, in all examined patients reflects the high functional activity of the central nervous system.

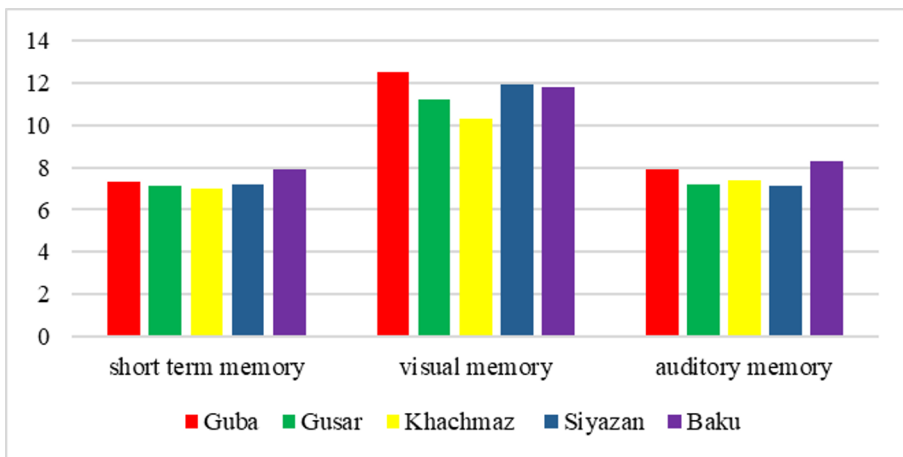


Fig. 3. Results of a Study of Short-Term Memory, Visual and Auditory Memory in Younger Schoolchildren.

From nonverbal tests, an indicator of the level of attention was studied using the Wexler Method of “Missing Detail”. Among the cognitive processes, the processes of attention, which are considered the most complex by the mechanisms of formation, are within the normal range for all surveyed schoolchildren (the attention index is 7.5 points for Guba schoolchildren; 7.4 points for Gusar schoolchildren; 7.2 points for Khachmaz schoolchildren); 7.6 points for Siyazan schoolchildren and 8.9 points for schoolchildren in Baku (Fig.4). If to pay attention, it can be seen that the attention index of Baku schoolchildren characterizes a relatively higher level. This may be due to the fact that they are in contact with a large number of information sources, use various computer games more, etc.

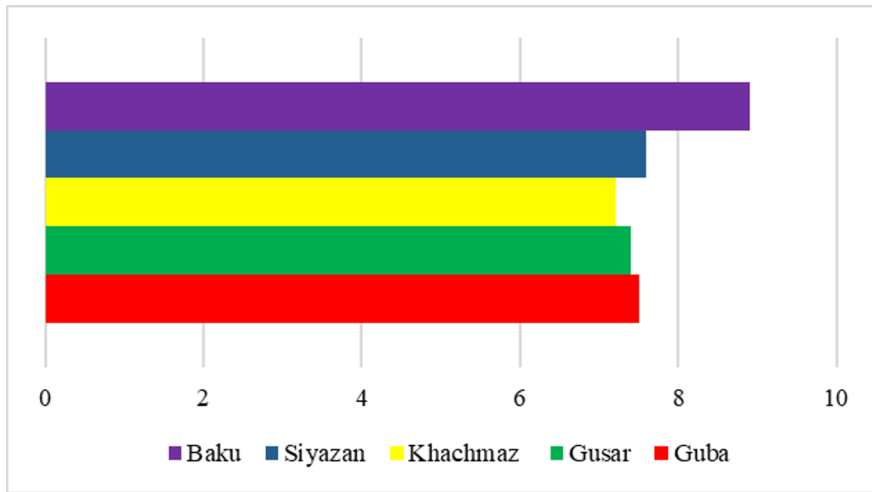


Fig. 4. The Results of the Attention Indicator Study in Younger School children.

Thus, summing up the results of the conducted research, it is known that although the mental development of practically healthy schoolchildren is within the normal range, the emotional state of Baku schoolchildren is more intense than that of other peers (a high level of individual excitement). It's natural that, schoolchildren living in a large city have more restrictions in movement, a tendency to hypokinesia, an abundance of information, constant close contact with sources of electromagnetic radiation, a decrease in the nutritional value of food consumed (deficiency of vitamins, minerals, etc.) and an increase in body weight as a result of increased calorie intake, low oxygen in the respiratory air, sleep and rest disorders, and social isolation, etc. [1,3,4,13,15].

Schoolchildren living in other mountainous, foothill and coastal regions should be more physically active, eat natural food and water rich in minerals, have less contact with sources of electromagnetic radiation, breathe oxygen-saturated air, a stable sleep regime, avoid exposure to vibration and noise factors, a more environmentally friendly environment, etc. The effects of such conditions contribute to healthy neuropsychiatric development, better formation of sensory systems, emotional stability and normalization of cognitive processes [2,5,6,10,11].

4 Conclusions

1. It has been established that young schoolchildren living in areas with different topography and climate have normal neuropsychic development.
2. Baku schoolchildren had a higher emotional index and individual excitability than their peers.

3. Indicators of anxiety within the normal range in younger schoolchildren living in mountainous, foothill and coastal areas indicate their greater emotional stability.

4. Strong development of the sensory system and, as a result, a higher level of visual memory was noted in younger schoolchildren living in mountainous, foothill and coastal areas.

5. In general, the ecologically clean environment of the northern regions of Azerbaijan allows children and adolescents living in these areas to have quite normal growth, neuropsychic and physical development, and the normal formation of higher nervous activity. Our results have proved this once again.

References

1. C.W.Thompson. Linking landscape and health: the recurring theme. *Landsc. Urban Plan.* 99, 187–195 (2011). doi: 10.1016/j.landurbplan.2010.10.00610.006
2. E.Sella, M.Bolognesi, E.Bergamini. Psychological Benefits of Attending Forest School for Preschool Children: A Systematic Review. *Educ Psychol Rev* **35**, 29 (2023). <https://doi.org/10.1007/s10648-023-09750-4>
3. I.Knez, I.Eliasson. Relationships between Personal and Collective Place Identity and Well-Being in Mountain Communities. *Front. Psychol.* 8:79 (2017) doi: 10.3389/fpsyg.2017.00079
4. Q.Wang On the cultural constitution of collective memory. *Memory.*16, 305–317 (2008). doi: 10.1080/09658210701801467
5. M.Sherman, C.B.Key. The Intelligence of Isolated Mountain Children.” *Child Development*, vol. 3, no. 4, pp. 279–90. JSTOR, <https://doi.org/10.2307/1125355>.
6. N.T.Sau, H.T.Hoi. Emotions and Social skills of Ethnic Minority Children in the Northern Areas of Vietnam. *Psychology and education* (2021) 58(2): 11192-11198.
7. N.Y.Karamova, Z.G.Mamedov. Features of the influence of emotional stress on cognitive processes in adolescents depending on the initial level of mental development. "Natural sciences", *Bulletin of MOGU*, No. 1 (2011). pp. 22-25. <https://vestnik-mgou.ru/Articles/View/6042>
8. N.Y.Karamova, A.A.Shirinova. Main characteristics of adolescence period (literature review). "NATIONAL SCIENCE" journal. International Research Center "Endless Light in Science", Pages 432-436 (2023). Kazakhstan.
9. N.Y.Karamova, Z.Hakverdieva, Kh.Akbarova, E.Kazenferov The study about the impact of emotional tension on the students' excitement and memory processes. *World Science*, № 8(48) Vol.3, p.34-38 (2019), Poland.
10. O.J.Sando, E.B.H. Sandseter. Affordances for physical activity and well-being in the ECEC outdoor environment. *Journal of Environmental Psychology*. Volume 69, (2020), 01430. <https://doi.org/10.1016/j.jenvp.2020.101430>
11. R.L.Coley, A.D.Lynch, M.Kull. Early Exposure to Environmental Chaos and Children's Physical and Mental Health. *Early Child Res.* 32: 94–104. (2015) doi:10.1016/j.ecresq.2015.03.001
12. R.Wheeler. Mining memories in a rural community: landscape, temporality and place identity. *J. Rural Stud.* 36, 22–32 (2014). doi: 10.1016/j.jrurstud.2014.06.005
13. T.Arola, M.Aulake, A.Ott, M.Lindholm, P.Kouvonen, P.Virtanen, R.Paloniemi. The impacts of nature connectedness on children's well-being: Systematic literature review. *Journal of Environmental Psychology*. Volume 85 (2023), 101913. <https://doi.org/10.1016/j.jenvp.2022.101913>

14. T.Weiss, P.H. Kahn Jr., L.W.Lam. Children's interactions with relatively wild nature associated with more relational behavior: A model of child-nature interaction in a forest preschool. *Journal of Environmental Psychology*. Volume 86 (2023), 101941. <https://doi.org/10.1016/j.jenvp.2022.101941>
15. O. Semak. Psychosomatic disorders of the endocrine system in children of the mountainous areas. *Mountain School of Ukrainian Carpaty*, (19), 40–45. (2018). <https://doi.org/10.15330/msuc.2018.19.40-45>.