

The Influence of Innovative Forms of Education on the Physical Development of Schoolchildren

Elena A. Tkachuk^{1,2*}, Lyubov V. Rychkova

¹Scientific Centre for Family Health and Human Reproduction Problems

²Irkutsk State Medical University

Irkutsk, Russia

Abstract

Background: The school system is forced to change with the development of scientific and technological progress, and advances in the information society and education. However, not all changes in the school system have produced positive results. Innovations in education have actually led to a decrease in the level of health and physical development of children. The problem of health and physical development of children is currently relevant, especially in the transition from mass unified education to differentiated education. The purpose of our research was to study the indicators of physical development of primary school students enrolled in schools of different types.

Methods and Results: The younger students enrolled in the first and third grades of traditional primary school and innovative school were under supervision. Children were formed into age groups according to their full calendar age. The study involved primary school students (n=499) aged between 7 and 9 after studying the risk factors in ontogenesis. One hundred fifty-two children were trained in a traditional school: 78 children aged 7-8 years and 74 children aged 8-9 years. Three hundred forty-seven children were trained in the innovative school: 116 children aged 7-8 years and 231 children aged 8-9 years. The physical development of the school children was determined by weight, height, and chest circumference. Performance was evaluated through percentile-type tables.

The research allowed us to conclude that the increased workload in the innovative school leads to a decrease in the growth of body length and weight and a lag in the growth rate of anthropometric indicators, compared with children enrolled in the programs of traditional schools. Innovations in education require further study of health and the health of children, development of hygienic standards, methodological approaches to pediatric care, and physical education of preschool children. (**International Journal of Biomedicine. 2022;12(3):401-403.**)

Keywords: children • physical development • education system

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Introduction

Students are in the education system from 3 to 24 years, and all this time, they are under pressure, which some authors compare with adverse environmental factors.⁽¹⁾

It is known that the risk factors in the period spent in school are continuous, systematic, and long. Many authors have noted that the influence of the school environment, which

affects the child daily throughout the period of training,⁽²⁾ is usually accompanied by violations of mental, somatic, and physical health.⁽³⁾

Problem Statement

Currently, the problem of health has become the most urgent. At the stage of the transition from unified mass education to differentiated education, the implemented educational programs are diverse and often do not correspond to the physiological, physical, and mental capabilities of children. Physical development is of particular importance for children of primary school age, as it is the most sensitive factor at this age.⁽⁴⁾

***Corresponding author:** Prof. Elena A. Tkachuk, PhD, ScD, Scientific Centre for Family Health and Human Reproduction Problems, Irkutsk, the Russian Federation. E-mail: zdorowie38@gmail.com

The reform of the school system increases the impact of stressful factors on children, and the introduction of new technologies and forms of education, including the innovative type, lead to deterioration of the functional state of the body, reduce children's performance, and violate physiological needs for sleep and rest.⁽⁵⁾

Comparing these indicators in traditional and innovative schools will reveal trends in changing conditions in the education system. Some authors note that with the innovative education system, the teaching load on children in schools increases by 1.5-2 times in one school week.⁽⁶⁾

Among high school students of lyceums who are enrolled in innovative programs, disharmonious development is more often revealed, a tendency to slow down the growth rate, and body weight deficit is 2 times greater than in traditional schools.⁽⁷⁾

Researchers of hygiene of children and adolescents note that today the physical development of children's and adolescents' body circumference tends to decrease, as do functional indicators and the rate of acceleration. In addition, there is a lack of weight and length of the body, and a backlog of biological development.⁽⁸⁾

Innovative training load significantly wearies students, thereby reducing the absorption of the material being studied and sometimes disrupting adaptation. Increasing the tension in the schoolwork causes the growth of fatigue in students. This problem is significant in institutions with such new kinds of curricula, such as the gymnasiums and the lyceums, which primarily use innovative educational programs.⁽⁹⁾ We studied the impact of educational innovation on the physical development of children of primary school age in this research.

The purpose of our research was to study the indicators of physical development of primary school students enrolled in schools of different types.

Materials and Methods

The younger students enrolled in the first and third grades of traditional primary school and innovative school were under supervision.

The groups were formed by a continuous method; children with high social stigma, pronounced risk factors in ontogenesis, and burdened with biological and social history were excluded from the study groups. Evaluation of the ontogenesis of children was conducted during the collection of anamnesis of the child's life, determining ancestry of at least 3 generations, and information about the history of the development. Genealogical factors were analyzed using a genealogical index, defined as the total number of diseases in blood relatives proband divided by the total number of blood relatives. The genealogical history levels were accounted as low, moderate, high, and severe.⁽¹⁰⁾

The burden of biological history was defined by risk factors in the antenatal, intrapartum, early neonatal, neonatal and postnatal periods. The level of the social stigma was used to judge the problem of the intrauterine period.⁽¹⁰⁾

We took into account the completeness of the family, the education and profession of parents, the age of parents, the

financial security of the family, the psychological microclimate in the family, the presence or absence in the family of bad habits and antisocial forms of behavior, housing and living conditions, sanitary and hygienic conditions of education of the child, regime and educational factors in the analysis of social history.⁽¹⁰⁾

Children were formed into age groups according to their full calendar age. The study involved primary school students (n=499) aged between 7 and 9 after studying the risk factors in ontogenesis. One hundred fifty-two children were trained in a traditional school: 78 children aged 7-8 years and 74 children aged 8-9 years. Three hundred forty-seven children were trained in the innovative school: 116 children aged 7-8 years and 231 children aged 8-9 years. The research presents the results of simultaneous studies; in this regard, the age groups were not identical.

The physical development of the school children was determined by weight, height, and chest circumference. Performance was evaluated through percentile-type tables.⁽⁶⁾

The study was conducted in accordance with ethical principles of the WMA Declaration of Helsinki (1964, ed. 2013). Written informed consent was obtained from the participant's parent/guardian.

Statistical analysis was performed using the *Statistica* 10 software package (Stat-Soft Inc., USA). Analysis of the distribution of values obtained was performed using the Kolmogorov-Smirnov test. The mean (M) and standard error of the mean (SEM) were deduced. For data with normal distribution, inter-group comparisons were performed using Student's t-test. Differences of continuous variables departing from the normal distribution were tested by the Mann-Whitney U-test. A probability value of $P < 0.05$ was considered statistically significant.

Results

The children living in the family were assessed by parents who found sanitary and hygienic living conditions satisfactory in 95.07% of families for children of traditional schools and 94.31% of innovative schools.⁽¹¹⁾

The research showed that the children in the first year of study at the innovative school differed from the children of traditional schools in physical development at admission. Thus, body weight in children of the innovative school were higher than in the traditional school, and these values had statistically significant differences ($P < 0.05$) (Fig.1).

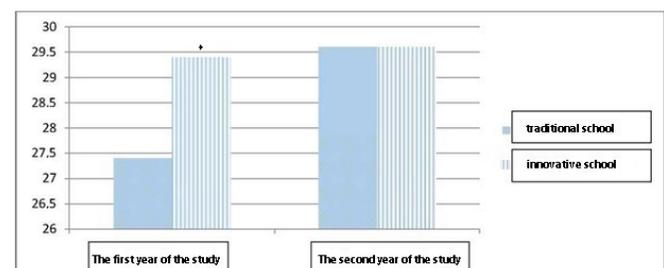


Fig.1. Body weight (kg), * $P < 0.05$.

Growth rates at the same age in the innovative school were also statistically higher than in children of the traditional school ($P < 0.05$) (Fig.2). According to our assumption, this testified to a more favorable social situation for families who want a child to be taught in an innovative type of school. After the first year of the study, the body weight and growth rates were equal in both types of schools in children 8-9 years old, which may indicate the adverse impact of innovative forms of education on the physical development of children.

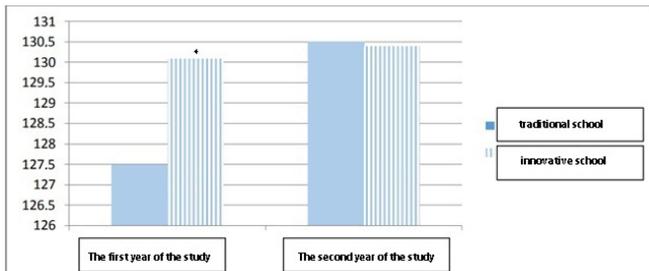


Fig. 2. Body height (cm), * $P < 0.05$.

In the study of the indicators of chest circumference, these trends were maintained, but statistically significant differences were not observed ($P > 0.05$) (Fig.3). The research allowed us to conclude that the increased workload in the innovative school leads to a decrease in the growth of body length and weight and a lag in the growth rate of anthropometric indicators, compared with children enrolled in the programs of traditional schools.

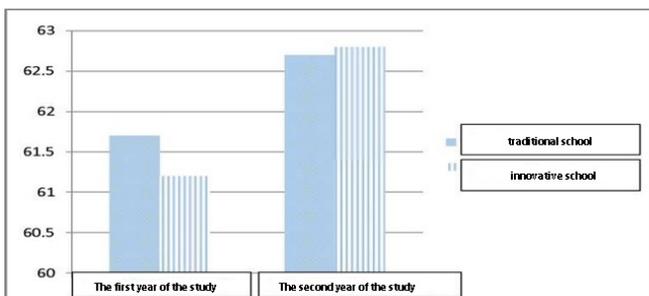


Fig. 3. Chest circumference (cm).

Physical development is a very sensitive indicator, especially for children of preschool age and primary school children. Therefore, any adverse impact on children during this period necessarily affects their physical development.⁽¹²⁻¹⁴⁾

In conclusion, the findings suggest that school innovations have an adverse impact on the physical development of children due to their stressful effects. Innovations in education require further study of health and the health of children, development of hygienic standards, methodological approaches to pediatric care, and physical education of preschool children.

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