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ASSESSMENT OF PHYSICAL DEVELOPMENT IN RELATION TO EXERCISE TIME AND EATING HABITS OF TEENAGERS IN MOLDOVA

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Abstract

Diet is a factor that contributes significantly to maintaining the health of young people. This study was conducted on a sample of 206 students from computer science high schools in Moldova. Physical development, and time allocated were quantified for physical exercise and nutrition. Of the whole group, 61.65% were assessed with harmonious development. The time allocated for physical exercise is often less than 30 minutes for 49.51% of the students in the study batch. Differences calculated based on the assessment of physical development were statistically significant at $p < 0.05$ ($f=4$, $\chi^2=10.463$), drawing attention to young people who develop disharmoniously, with excess weight, and who do not exercise enough. The dominant frequency for intake of milk (27.18%, $p>0.05$ $f=8$, $\chi^2=7.201$), chicken meat (43.68%, $p>0.05$ $f=8$, $\chi^2=7.242$), potatoes (40.77%, $p>0.05$, $f=8$, $\chi^2=4.954$) and cereal products (35.43%, $p>0.05$ $f=8$, $\chi^2=7.258$) is 2-3 times per week and the differences calculated based on the assessment of physical development are insignificant. The students evaluated do not see an adaptation of nutrition as a bodily need, which is a risk factor.

Keywords: Disharmonious development, obesity, physical exercise, nutrition.

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1. Introduction

Growth and development of children and youth are two processes influenced by several internal factors (heredity) and external factors (environmental). External factors include geo-climatic conditions, the origin of the family (urban-rural), food, housing, socio-economic conditions of the family, exercise and exposure to certain environmental pollutants. Geo-climatic conditions influence growth especially through the flora and fauna in the area; practically through nutrition. The quality of housing and food are closely related to the socio-economic situation of the family (Datar & Nicosia, 2017). Growth is the quantitative process of the individual somatic indicators, based on the characteristic of the genetic and environment factors and development refers to the qualitative level of individual somatic indices, depend on the genetic, educational, environmental factors (Abalaşei, 2012). In low income families, nutrition is often very poor in quality especially because animal products are more expensive, the house is often dirty, overcrowded and insufficient care is given to young children and later to teenagers (Sonenstein, 2014). Physical exercise triggers a series of adaptive and compensatory modifications that directly contribute to better growth and body development. Pollution related to air, water and food is present especially in large urban areas, which can also seriously affect children and young people's development.

Diet is a major external factor that contributes to ensuring a balanced growth of children and teenagers. Currently, there are numerous problems related to food intake and its trends. The diet of the population is in constant change due to the need of ensuring increasingly large quantities of food (associated with global population growth) but also due to changes occurring in eating habits (Zugravu, 2015). In recent decades, we are witnessing an increasing imbalance in nutrition because of some factors: psychological (the pleasure of eating certain foods), sociological (frequent meals outside the home), economic (the ease with which we procure some foods) and sensory (pleasure gained when consuming a particular product) (Fredot, 2007). This imbalance in nutrition must be acknowledged by specialists and must be closely monitored in order to prevent an explosive emergence of eating disorders.

In Romania, in addition to these general issues, there is a particular characteristic represented by strong anchoring in traditions, especially regarding eating habits. It is a peculiarity observed especially in Moldavia and must be closely monitored. Designing national programs to change the eating habits of young people must start from first knowing the regional peculiarities of the population; its traditions, habits, economy etc. Giving fruit in schools, to a group of students who already consume fruit on a daily basis, does not change eating habits (Albu, Moraru & Hodorcă, 2015). We may see changes in the nutrition of young people if we base our strategies on coherent data. Another important aspect is related to the practice of daily exercise. Young people need guidance in this regard, especially those from Romania, where practicing physical exercise, for relaxation purposes, is not a habit.

2. Problem Statement

In the past few decades, adolescents, especially females, relate to the ideal of beauty, represented by the very skinny young woman and the young man with low muscle mass. This raises many questions as the young people may have a balanced development, but which does not correspond to the ideal. Dissatisfied with the physical appearance, young people are tempted to use exaggerated cures, which may endanger the

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health (Milici & Rovillé-Sausse, 2016). The maintenance of a tangible balanced weight can be attained only by means of an appropriate diet, associated with sustained physical activity. Another aspect which must be prioritised is that underweight adolescents do not undertake intensive physical exercise because they want to maintain a minimal body weight which can also be dangerous to growth.

3. Research Questions

3.1 Is the physical development of the students from the study batch appropriate to their age?

3.2 Is the percentage of students with a harmonic development is dominantly or weakly represented?

3.3 Do young people with excess weight ratio resort to physical activity as a means of controlling their own body weight?

3.4 Are there differences in the dietary habits of overweight and underweight students?

4. Purpose of the Study

This study evaluates the physical development of the study batch on the basis of comparison with values of national reference. Further, the study aims to identify the time allotted for daily physical activity and reports the physical development of the study batch. Finally, the study aims to evaluate the extent to which the dietary habits of young people in the study batch changes / does not change from their own physical development.

5. Research Methods

The study was conducted on a sample of 206 students from science high schools in Iasi and Piatra Neamt, cities in Moldavia. Students are in grades 9 -12 and are between the ages of 15 and 19. The study is focused on three main areas represented by: the assessment of physical development, and allotted time for physical activities and nutrition. Assessment of physical development is quantified by the correlation between the height and weight of the students. The two indicators are compared with reference values from the national standards, which allows us to calculate the sigma ranges. By using the mean value and standard deviation, it is possible to define the sigma ranges that include the anthropometric indicator values: very low values (in the range between -3 sigma and -2 sigma), low (in the range between -2 sigma and -1 sigma) average (mean value +/- 1 sigma), high (in the range between +1 sigma and +2 sigma) or very high (in the range between +2 sigma and +3 sigma) (Bardov, 2009). If the two indicators are placed in the same sigma range, this shows harmonious development. If the two indicators are placed in different sigma ranges, the development is disharmonious with weight deficit (for example, if the height is in the high or very high range and the weight is in the low range) or excess weight (for example, the height value in the low or average range and the weight value in the high range). Assessment of physical development is the core of this study. From the values obtained, we will calculate if there is a correlation with exercise and nutrition.

Time allotted for physical activity was assessed using a questionnaire. There are three categories: less than 30 minutes, between 30 and 60 minutes, and more than 60 minutes. Nutrition was assessed from a questionnaire of weekly food intake which allows us to quantify the eating habits of the students. The study was focused on assessing the weekly consumption of milk and chicken (animal source foods) and the

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weekly intake of potato or cereal products (plant-based foods). The response options are: never, once a week, 2-3 times a week, 4-6 times a week and daily. The statistical processing was performed using Pearson chi-squared test.

6. Findings

The first aspect we studied is the assessment of physical development. The evaluation is important for students from computer science high schools, as these are young people who sit, daily, in front of a computer for long periods of time.

The result is a balanced one, with only 20.38% disharmonious with excess weight. They should be carefully monitored in order to track their development (Table 01). In this study, we evaluated the time allotted for exercise and especially, the study of eating habits.

Table 01. The assessment of physical development for the observed students

Physical development			
Harmonious	Disharmonious with weight deficit	Disharmonious with excess weight	Total
127	37	42	206
61.65%	17.96%	20.38%	

Students from computer science high schools take part in predominantly static activities that will also characterize their profession in their future. In this context, daily physical activity is important for maintaining general health and for the prevention of spinal deformities.

The largest category (49.51% of students) sets aside under 30 minutes for daily physical exercise, which is insufficient (Table 02). At the opposite end, only 19.90% of students allow for over 60 minutes of daily exercise.

Table 02. Correlation between the assessment of physical development and time allotted for physical exercise

Physical development	Allotted time for physical activities			Total
	Under 30 minutes	30-60 minutes	Over 60 minutes	
Harmonious	54	40	33	127
Disharmonious with weight deficit	23	9	5	37
Disharmonious with excess weight	25	14	3	42
Total	102	63	41	206
%	49.51	30.58	19.90	

Differences calculated based on the assessment of physical development are statistically significant at $p < 0.05$ ($f=4$, $\chi^2=10.463$) and show a marked reduction in the time allocated to physical exercise for students with a disharmonic development with excess weight. These young people should avoid a sedentary lifestyle (risk factor for obesity) by increasing their interest in physical activities of low or medium intensity (Ţigănaş, Zepca & Zaporojan, 2015; Galvan, Monroy-Campos, Lopez- Rodriguez, & Amigo, 2017).

Nutrition was determined based on the assessment of physical development, which allowed us to appraise the nutritional mistakes made by young people at risk for obesity.

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Milk has a high nutritional value, but modest caloric value, so it must be included in the diets of young people (Chevallier, 2009). Dominant intake is 2-3 times per week (27.18% of students) and once per week (21.35% of students), which is totally insufficient. Our attention is drawn to the 19.90% of young people who answer daily intake, and the 15.04% who reported not consuming any milk (Table 03).

Table 03. The frequency of milk intake

Physical development	Weekly intake of milk				
	Never	Once	2-3 times	4-6 times	Daily
Harmonious	21	22	34	23	27
Disharmonious with weight deficit	6	9	9	4	9
Disharmonious with excess weight	4	13	13	7	5
Total	31	44	56	34	41
%	15.04	21.35	27.18	16.50	19.90

Differences calculated from evaluation of physical development are not statistically significant ($p > 0.05$ $f=8$, $\chi^2=7.201$) and suggest the existence of similar nutritional mistakes among students surveyed, in spite of the different results obtained in the assessment.

Chicken meat has a modest caloric value and is low in fat. In this context, it is a suitable product for all ages and for all body weights. Dominant categories are: 2-3 times per week (43.68% of students) and 4-6 times per week (27.66% of students). We must pay close attention to the 18.44% of young people who say they consume chicken meat once a week and the 3.88% who do not eat chicken meat at all (Table 04).

Table 04. The frequency of chicken meat in the diets of young people

Physical development	Weekly intake of chicken				
	Never	Once	2-3 times	4-6 times	Daily
Harmonious	6	21	53	39	8
Disharmonious with weight deficit	2	5	20	8	2
Disharmonious with excess weight	0	12	17	10	3
Total	8	38	90	57	13
%	3.88	18.44	43.68	27.66	6.31

Differences are not statistically significant ($p>0.05$ $f=8$, $\chi^2=7.242$) and point towards a strong anchoring in the nutritional tradition of the families of surveyed students.

Plant products studied were the potatoes and grain products. The potato is often present, particularly 2-3 times (40.77% of students) or 4-6 times (30.58% of students) per week (Table 05). We must not overlook the 1.45% of students who do not consume potatoes at all and the 16.50% of who consume potatoes only once per week, which is surprising given the fact that this product is traditionally grown in Moldavia.

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Table 05. The frequency of potatoes in the diets of young people

Physical development	Weekly intake of potatoes				
	Never	Once	2-3 times	4-6 times	Daily
Harmonious	2	22	50	36	17
Disharmonious with weight deficit	1	6	14	13	3
Disharmonious with excess weight	0	6	20	14	2
Total	3	34	84	63	22
%	1.45	16.50	40.77	30.58	10.67

Statistically significant differences obtained ($p>0.05$ $f=8$, $\chi^2=4.954$), show a lack of awareness of young people about the nutritional value of food and obviously a strong influence of familial tradition.

Grain products have high nutritional value, so their presence in the menus of obese young people must be closely monitored (Martin & Tarcea, 2015). Dominant categories are: once per week (39.32% of students) and 2-3 times per week (35.43% of students) which is quite modest. However, the statistically insignificant differences ($p>0.05$ $f=8$, $\chi^2=7.258$) calculated, taking into account physical development, draw our attention towards the obese students who do not intend to change their diet or who are not at all concerned with this aspect (Table 06).

Table 06. Frequency of cereal products intake

Physical development	Weekly intake of cereal products and rice				
	Never	Once	2-3 times	4-6 times	Daily
Harmonious	15	52	46	6	8
Disharmonious with weight deficit	6	15	14	1	1
Disharmonious with excess weight	10	14	13	4	1
Total	31	81	73	11	10
%	15.04	39.32	35.43	5.33	4.85

Broadly speaking, we must be mindful of three important characteristics, represented by the growth process, the specific activities of students from computer science high schools and the tendency to respect traditional eating habits.

Growth appears uneven with long periods of growth in height alternating with the periods of growth in weight. At 15, 16 or 17 years of age, growth is still not completely finished, so the interpretation of results in the assessment of physical development must be done carefully (Albu & Rada, 2014; Luca, Badrajan, Savu & Leasevici, 2015). We must observe the evolution of disharmonious growth to determine if it is only related to a growth spurt or if it is a persistent issue. It is necessary to monitor both the students with excess weight and those with weight deficit (Stănescu, Stoicescu & Bejan, 2018).

Estimating the growth and development of children and young people is even more important in recent decades because of the changes in the so called “beauty standards”. Until the 1960s, the ideal of female beauty was represented by "chubby and beautiful". In later years, from that concept, the ideals started to change gradually towards the “slim woman” and the “muscular man” (Milici, & Rovillé-Sausse, 2016).

Teenagers need close supervision because they are easily swayed by the idea of beauty proffered by the mass media. They have a normal body shape and adequate weight but since these do not correspond to the mass media stereotyped “beauty standards”, young people may become negligent towards proper

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nutritional needs and only focus on attaining a skewed external appearance which resonates with their "ideal" media-fuelled mental image. This can lead to drastic and sometimes dangerous diets, associated with systematic physical exercise that is increased both in time and intensity (Albu & Rada, 2014).

Currently, the ideal concept for beauty is the "90-60-90" notion (chest-waist-hips measurements) so teenagers and especially girls are preoccupied with excessive weight-loss regimens, associated with intense physical activity (Neumark-Sztainer, 2015). In our studied sample, we observe the association between disharmonious development with excess weight and a reduction of time allotted for physical activity. We can also see a number of young people who reveal disharmonious development with weight deficit and who exercise over 60 minutes daily.

Computer science high school students spend a considerable time at the computer and this time will increase when starting their careers. These young people are exposed to the risk of spinal deformities, which requires constant practice of corrective exercises. From high school, these young people can be guided in this direction, which will help maintain their health. Unfortunately, there are few young people who pay attention to these issues and there is little concern in schools for implementing consistent physical education programs (Galvan, Monroy-Campos, Lopez- Rodriguez & Amigo, 2017). Adolescents are frequently exempted from physical education classes because of their inability to perform academically which risks ruining their general scholastic scores. In this case, both short and long term health goals are sacrificed for short term academic results.

A program for controlling and maintaining the ideal weight has two basic components represented by physical exercise and adequate nutrition. Practicing systematic physical exercise contributes to: increased spending of energy reserves by the body, appetite control and stress control, the prevention of muscle atrophy and the prevention of certain musculoskeletal, respiratory and circulatory illnesses (Webster-Gandy & Madden, 2006).

Ensuring a balanced diet is dependent on the socio-economic situation of the family, but also on the family's tendency to respect traditional eating habits. The issue of adherence to traditional eating habits is difficult and must be properly addressed (Zugravu, 2015). Young people surveyed tend not to change their diet, even if the risk of obesity requires it. This is a most alarming trend, which requires an in-depth study to identify the causes of such careless regard for and disengagement with nutritional needs among young people. The study can also recommend proper interventions by specialists to arrest this disharmonious development among young people.

The aspect of nutrition anchored in tradition, seen in the families of the young people surveyed, were observed in other studies on school students in Moldavia, which suggests to us the existence of a particular situation to be known and closely monitored by specialists (Albu, Moraru & Hodorcă, 2015).

A healthy diet implies consuming all food groups in adequate quantities (milk and dairy products, animal meat and meat products, fish meat and fish products, eggs, animal and vegetable fats, cereal products, vegetables, fruit, legumes and pulses, sugar and sugar-based products). Going on a weight-loss diet does not imply removing food groups from the menu; instead, losing weight should be focused on the reduction of daily quantities of food (Webster-Gandy & Madden, 2006).

Milk has high nutritional value (rich in quality protein, vitamins, minerals) associated with modest caloric value. Chicken is low in fat providing about 140 kcal/100 g (Fredot, 2007). However, we do not see

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an increase in consumption of these products in young people at risk for obesity and who should be preoccupied with weight-loss diets. They either do not even start diets, feeling good in their own skin or try to lose weight using various products on the market with "miraculous powers", which either do not work or could be very dangerous for their health.

In young people with disharmonious growth with excess weight, we do not see increased potato consumption associated with the reduction in the intake of cereal products. The potato has low caloric value (70-80 kcal/100 g) given the low content of carbohydrates and fat. In this context, potatoes can be consumed in high quantity, especially by young people who have weight problems (Martin & Tarcea, 2015). Grain products provide an increased caloric intake, because of the large quantity of carbohydrates. Eliminating them from the diet is not the issue; they should only be consumed in a lower quantity, an element that does not occur in children at risk for obesity.

7. Conclusion

The study results are not encouraging and, in some cases, even alarming, because physical activity is not a major concern of students surveyed and nutrition remains firmly anchored in tradition. The fact that unhealthy young people are not concerned about their excess weight and do not wish to remedy their unhealthy weight through proper nutritional means is indeed a shock and must be studied further.

Educational programs must be implemented, and they must be consistent with local issues related to nutrition. Teens must be properly informed about the measures necessary to maintain a healthy body.

National programs that are currently being applied in Romania are not consistent with the real needs of young people, so their efficiency is in doubt.

8. Implications

The results of the study will be useful for all the stakeholders involved in the healthy development of children and young people not only in Romania but all over the world. This would include the medical staff who work in schools and who need to be aware of the actual situation, the physical education teachers who can help design proper exercise regimes for young people, and parents because they provide valuable information relating to the physical development of their children and the problems they are likely to encounter. The Education Ministry needs to empower school authorities to impose an adequate time for physical activities and oversee proper nutritional intake where possible. The health of children and young people cannot be taken for granted as they are the citizens of the future who will contribute to national development, which they cannot so if they are unhealthy and succumb to diseases.

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