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ORIGINAL RESEARCH

THE RELATION BETWEEN THE DIETARY HABITS AND CHOICES, THE NUTRITIONAL STATUS AND THE PHYSICAL ACTIVITY REGIME IN ROMANIAN ADOLESCENTS
Elena Ioana Iconaru¹Constantin Ciucurel¹¹University of Pitesti, Faculty of Physical Education and Sport**Abstract**

Although adolescents are more active from a physical point of view than adults (the physical activity being considered a characteristic of this age stage), the reduction of their fitness level (especially in the conditions of an inadequate diet) represents a reduction of the protection against metabolic and cardio-vascular diseases of future adults. The aim of this study was to determine the correlations between the alimentation type, the nutritional status and the physical activity regime in Romanian adolescents. We realized a transversal correlational study by using questionnaires for the physical activity regime (Physical Activity Index, PAI) and the attitude towards nutrition (Eating Attitude Test, EAT-26). We also evaluated anthropometrical data: weight, height and body mass index on 200 Romanian adolescents (average age 16.1 years, sex ratio 1/1). We ascertained that gender induces modifications at the nutritional status level in the context of a certain type of attitude towards alimentation and physical activity regime ($p \leq 0.05$). The differences induced by gender among Romanian adolescents are based especially on the physical activity regime and less on the alimentation type and on the nutritional status. We determined reduced correlations between the nutritional status, the attitude towards alimentation and the physical activity regime for both sexes.

Key words: physical activity, adolescents, diet, nutritional status.

1. INTRODUCTION

During the last few years specialists have discussed more and more related to health promotion about the decline of physical activity and of the fitness level among adolescents (Rogol et al., 2000). In this context we appreciate that this general inactivity level will continually and unceasingly produce generations of overweight adolescents, who will be added to the adult persons affected by obesity and other metabolic chronic diseases (hyperglycemia, dyslipidemia, atherosclerosis etc.) (Pearson et al., 2009).

At present in Romania there are no sufficient data able to attest the reduction of the adolescents' physical activity level during the last 10-20 years, as well any conclusive data concerning the appreciation of this level of physical activity.

If the changes suffered in Romania during the hereinabove period at the level of diet can still be assumed, with a certain lack of precision, a complex evaluation of the relation of the attitude towards alimentation/physical effort/nutrition condition at adolescents represents a true challenge. The practical implications (economic and social) of such a study are obvious, considering as well the enormous expenses assumed by the health programs addressed to the persons suffering from obesity (and its complications).

In other words, the comprehension of the relation attitude towards alimentation/physical
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effort/nutrition condition represents the premises for the implementation of effective measures with a prophylactic character, which will reduce (including from an economical and medical point of view) the pressures exercised on the society by the categories of chronic patients suffering from disorders of the nutritional status (Loud et al., 2008).

Probably that in the near future we shall witness some major changes in Romania at the level of demographical, morbidity and mortality ratios (similar to other western countries), being able to appreciate that the premises of the future generations' health condition increase depend directly on the present sanogenetic policies.

Starting from the theoretical thoroughness of the interaction attitude towards alimentation/physical effort/nutrition condition, we proposed as applicative objective the establishment of certain correlations between the alimentation type, the nutritional status and the physical activity regime for the adolescents in a Romanian urban community.

In order to reach the two proposed objectives, we took into consideration the following *tasks*:

1. The study of the specialty literature regarding the hygiene of the adolescence stage of age (the morpho-functional characteristics of the adolescent), the physiological perspective over the physical activity regime at the respective age, the relation physical effort/diet starting from the energogenesis of the muscular contraction, the scientific bases of rational alimentation and the nutritional disorders (obesity and anorexia/disnutrition).

2. The study of the references related to the methodology of research in physical education and sports; we analyzed the modalities of surprising the nutritional status, the attitude towards nutrition and the physical activity regime, retaining the evaluation instruments adequate for use in the imposed conditions.

3. The construction of the experimental plan:

– The identification of the study group (a representative sample of adolescents from an urban community).

– The choice of the dependent variable characteristics (the regime of physical activity and the attitude towards alimentation) and of the classifying independent variables (age, weight, height, body mass ratio, gender).

– The establishment of the manner of evaluation of the dependent variable characteristics.

4. The performance of study group evaluations.

5. The analysis of the obtained results and the establishment of correlations between the described variables.

6. The formulation of conclusions and proposals.

The present project proposed as *work hypotheses* the following:

1. The gender induces modifications of the nutritional status for adolescents, in the context of a certain type of attitudes towards nutrition and physical activity regime.

2. The adequate nutrition condition of the adolescent is positively correlated with the physical activity regime to which he is submitted.

3. The attitude towards nutrition is correlated to the physical activity regime to normal-weight people and it is not correlated for overweight and obese people. The intensity of the correlation depends on personal factors (alimentation habits, preferences, the importance of spare time, the attraction towards sports activity).

2. MATERIAL AND METHOD

The performed research is a correlation transversal study, searching to establish the relation between two or several variables. In this project we used questionnaires for determining the physical activity ratio and for evaluating the attitude towards nutrition.

In order to determine the physical activity ratio of the adolescents we used the questionnaire entitled “*Physical Activity Index*” – PAI (modified after Dumitru, 1997). Starting from the physical activity ratio score, we know precisely the measures that need to be carried on starting from the respective moment. Thus, if we obtain more than 80 points, it means that the situation is very good (very active life style) and the person can maintain himself on the same line. A score between 60-80 reflects a good level of physical activity (an active and healthy person). In exchange, scores between 40-60 indicate an acceptable physical activity regime; if one does not obtain at least 40 points, it means that the lifestyle of the respective person is a sedentary one and the motion program that he currently performs does not bring him significant benefits regarding health, and so there is no effective protection against health affectation.

Also, for the evaluation of the attitude towards nutrition, we used the “*Eating Attitudes Test*” – EAT-26, that was adapted according to the pattern proposed by Garner D. M. and Garfinkle P. E. (1979). We included in this questionnaire some anthropometrical data like: gender, weight, weight excess and height. Starting from

the obtained information we calculated a series of synthetic coefficients.

The graphic contains a number of 26 items, each item with the following response variants, with their respective scores: „Always = 3, Very Often = 2, Often = 1, Sometimes = 0, Rarely = 0, Never = 0”.

The interpretation of the final result (obtained by summing the scores from each item) can be performed as follows: a score higher than 20 is equivalent to the predisposition to nutrition disorders. The more reduced the score is, the individual has an increasingly better attitude towards diet (Garner and Garfinkle, 1979).

The evaluation of the weight excess can be made according to Lorentz’s algorithm, where IW represents the ideal weight (kg), and H the height (cm):

$$IW_{\text{men}} = H - 100 - \frac{H - 150}{4} ; IW_{\text{women}} = H - 100 - \frac{H - 140}{4}$$

Another formula is the one of the body mass index (BMI, the Quetelet’s index): $BMI = W/H^2$

This research was performed during the period June 2009 on a group of pupils at adolescence age from Pitesti. The research measure was developed in several stages, which shall be detailed hereinbelow. The study group was constructed starting from the sampling principles.

In order to reach the applicative objective, we chose a study group made up of 200 adolescents, students in Pitesti high schools. The respective group is a representative sample for students subpopulation aged between 15-17 years old, with an urban residence address. The subjects were chosen randomly, by distributing the two questionnaires in classrooms with different profiles, within different high schools.

In what concerns the gender, the group includes a number of 100 girls and 100 boys (sex ratio 1/1). It is to be mentioned that there was no preference criterion for certain classrooms, profiles or high schools.

The boys’ lot average age was of 16.3 years, for this parameter the coefficient of variation being very small (4.5%, so the lot is very homogenous). The boys’ average height was of 169.9 cm, also the lot being very homogenous from this point of view (CV = 3.4%). Still on the boys’ lot, the average weight recorded the value of 64.4 kg, with a reduced variability coefficient (8.7%, increased homogeneity).

The situation is sort of similar for the girls’ group, the average age being 16 (CV= 5%, increased homogeneity), the average height 161.2 cm (a reduced value than the one corresponding to the boys, but with the same type of increased homogeneity, CV=3.4%). In exchange, the average weight was of 56.7 kg, the value being more reduced than the one of boys, with an average homogeneity of the group (CV=10.5%).

In general, the boys’ and girls’ morphological profiles are classified in the standards for the respective group of age, the differences related to sex being in the physiological limits specific to the organism’s post puberty maturation.

The students were included in workgroups, with a variable number of 15-25 subjects, for which the questionnaires filling in module was processed. In the situation in which certain questionnaires have not been filled in correctly or in case there were incomplete columns we gave up the respective subject, replacing him with another. In fact, the real number of those initially questioned was of 235 subjects, in the end renouncing to 35 of them, due to the hereinabove reasons.

By applying the two evaluation questionnaires for the physical activities and for the appreciation of the attitude towards nutrition respectively we obtained a series of parametric and nonparametric data based on which we shall try to formulate certain conclusions. The information obtained from subjects based on the questionnaires was transformed with the help of the nomograms from the specialty literature.

In the end, the data were collected and systematized in order to compare them and to surprise a general situation of the subjects’ physical activity degree in the context of a certain nutritional status and of an attitude specific towards nutrition. In order to obtain the statistic significance of the noted difference we passed on to the statistical processing of the resulting brute data.

3. RESEARCH RESULTS AND THEIR INTERPRETATION

After the study sample subjects filled in the questionnaires we proceeded to the processing of the recorded results, to the statistical analysis and to the interpretation of the results significance. Thus, according to table no. 1, we can affirm that at boys’ group level, the average body weigh coefficient has a normal value (22.3), for the group’s average age of 16.1 the value indicating a normal weight. We note that there is a weight deficit of 0.8% as compared to the ideal weight for the whole group of boys, the attitude towards nutrition is good (score 5.5), and the average physical activity coefficient is good (71.5), corresponding to a physical condition for active and healthy persons.

Boys	BMI	Ideal Weight	% Weight excess	EAT Score	Physical activity coefficient
\bar{x}	22.3	64.9	-0.8	5.5	71.5
σ	1.22	4.30	5.47	1.18	10.11
CV	5.5%	6.6%	-	21.4%	14.1%
Girls	BMI	Ideal Weight	% Weight excess	EAT Score	Physical activity coefficient
\bar{x}	21.8	55.9	1.4	5.1	56.8
σ	1.69	4.06	7.80	1.14	15.28
CV	7.8%	7.3%	-	22.4%	26.9%

Table no. 1 – Classifying variables for boys and girls (indicators of central tendency)

From the point of view of boys' group homogeneity reported to the evaluated parameters, the situation is not equal: we record an increase homogeneity for the body mass coefficient (5.5%), for the ideal weight (6.6%); for the percentage of weight excess the variability coefficient is not determinable, for the score at the evaluation questionnaire regarding the attitude towards nutrition the value exceeds the threshold of 20% corresponding to average homogeneity (21.4%, so we have a reduced homogeneity), and for the physical activity coefficient, the homogeneity is average (14.1%).

The data recorded for boys suggests a good nutritional status, a very good physical activity regime in the context of a good attitude towards nutrition. There are, nevertheless, large variations at the lot level, between weight deficit, overweight and obesity. We observe 12 cases (12% of the boys) of overweight and obesity (by comparing the BMI values with the nomogram).

At the girls' group level there are similarities, but there are also differences as compared to boys in relation to the tested parameters. Thus, the average body mass coefficient is normal (21.8), its value being smaller than boys' average value. Yet surprisingly, the girls' lot (with an average age of 16) has an average weight excess of 1.4%, in the conditions of a good score for the attitude towards alimentation, but inferior than the one recorded for boys (5.1) and of an acceptable physical activity coefficient (56.8 – fact that corresponds to a reasonable physical activity regime).

The explanation of this noted situation could be based on the evaluation of the standard deviation and of the variation coefficients for the tested parameters. In general the spreading of the data is more increased for girls than for boys (good homogeneity for BMI – 7.8%, reduced homogeneity for the score at the evaluation questionnaire for the attitude towards alimentation – 22.4% and for the physical activity coefficient – 26.9%). For the weight excess, the variability coefficient is also undeterminable.

According to the nomogram, the BMI values from the girls' group indicate 10 cases of overweight and obesity (namely 10% of the girls. In general, the girls' sample distinguishes by a more reduced regime of physical activity as compared to boys' group, in the conditions of slight weight excess and of a good attitude towards nutrition. In other words, the differences between sexes among adolescents are based especially on the physical activity regime and less on the attitude towards alimentation (which influences implicitly the nutritional status).

Determining the statistical significance of the differences between the means of the tested parameters, we observed (table no. 2) that the threshold "p" is acceptable for height, weight, body mass coefficient, weight excess, score at the questionnaire for the attitude towards alimentation and physical activity coefficient.

	Age	Height	Weight	BMI	% Weight excess	EAT Score	Physical activity coefficient
t	0,92	7,80	6,64	1,70	1,66	1,89	5,67
p	–	≤0,001	≤0,001	≤0,05	≤0,05	≤0,03	≤0,001

Table no. 2 – Data regarding the statistic significance of the differences between the means of the tested parameters in boys' and girls' group

Thus, we can reject the null hypothesis for the differences of the means of the respective parameters, the noted situation not being accidental. So, the gender induces modifications of the nutritional status, in the context of a certain type of attitude towards alimentation and physical activity regime.

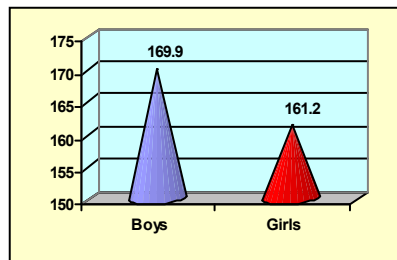


Fig. no. 1 – Statistic significance of the differences between the means of height between boys' and girls' group

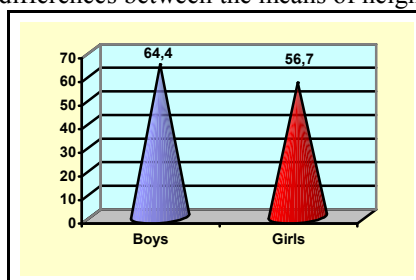


Fig. no. 2 – Statistic significance of the differences between the means of weight between boys' group and girls' group

The different observed patterns can be explained by the physiological differences (hormonally induced) and psychological (behavioral) between the two genders: girls enter and finish each puberty stage earlier than boys.

Puberty duration varies extensively among healthy individuals, the faster or slower maturation being conditioned especially by the genetic factors. The interval of the normal variability for the morpho-functional development can be nevertheless altered by the energetic unbalances between the food share and the expenses by means of the physical activity, especially at the adolescence critical age

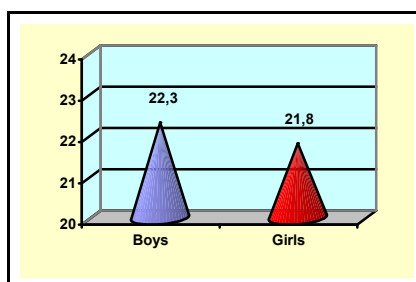


Fig. no. 3 – Statistic significance of the differences between the means of BMI between boys' and girls' group

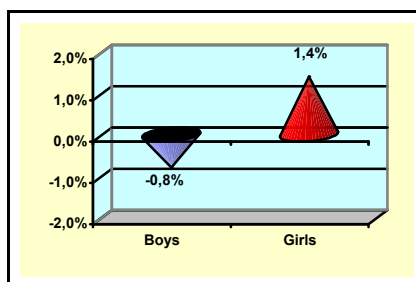


Fig. no. 4 – Statistic significance of the differences between the means of weight excess between boys' and girls' group

In conclusion, the adolescence weight excess appears as a complex and dynamic phenomenon, correlated with the physical activity regime and with the alimentary habits (type of diet). Due to the large variations regarding the hormonal pubertal and post pubertal status from individual to individual, the attitude towards alimentation and the physical activity influence differently the maturation of adolescents' organism.

Thus, the nutritional deficit appears especially in the context of the negative energetic balance (alimentary caloric deficit), and overweight and obesity by the energetic surplus caused by alimentary excesses, the physical activity regime being relatively good for the entire boys' sample and satisfactory for the girls.

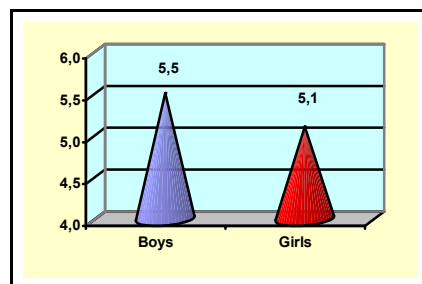


Fig. no. 5 – Statistic significance of the differences between the means of EAT score between boys' and girls' group

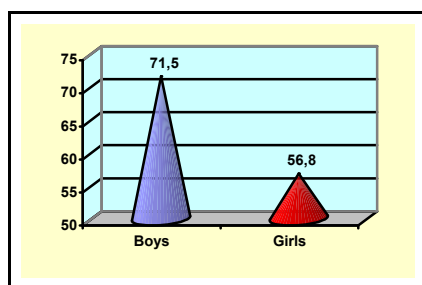


Fig. no. 6 – Statistic significance of the differences between the means of physical activity coefficient between boys' and girls' group

In general we can appreciate that we have the possibility to improve the diet for the adolescents of both sexes, considering the organism's type of solicitation and the morpho-functional characteristics related to sex. The determination being multifactorial, the general situation must be detailed for each individual (case study), the recommendations being adapted for each specific case. This training and intervention task is incumbent on all persons involved in students' instructive-educative activity (the physical education teachers being able to have a decisive role in this direction), on the medical staff, on family etc.

We can affirm that the measure for the identification of the factors responsible for the unbalances of the proportion attitude towards alimentation/physical effort/nutrition condition can be followed by the application of certain individualized programs of intervention and prophylaxis (being known the fact that many of adults diseases have their origin in childhood and adolescence), with a major impact on the health condition at the level of the mentioned population group. The attitude towards alimentation and the physical activity influences therefore the adolescents' process of growth and development, as well as their health condition as associated factors, but also as separate factors, their effect being of cummulation.

Another interesting aspect concerns the overweight and obese subjects' importance in the study groups. Thus, we notice at boys' group an increased frequency of the weight excess (12%) as compared to girls group (10%).

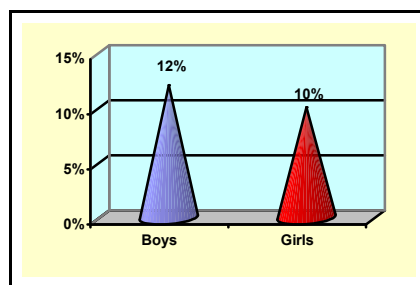


Fig. no. 7 – Frequency of the weight excess and obesity in boys’ and girls’ group

The values are in accordance with the data from the specialty literature, indicating the fact that girls’ early puberty maturation induces the tendency of the height/weight proportion modification and in relation to this proportion; the expected weight is also modified. Therefore, although girls have a more reduced physical activity regime than the one of boys, in boys’ group the frequency for overweight appearance is still increased.

Another purpose of the research was represented by the determination of simple correlations (Bravais-Pearson coefficient) from all tested parameters (tables 3 and 4).

	Age	Height	Weight	BMI	Ideal weight	% Weight excess	EAT Score	Physical activity coefficient
Age	1,00							
Height	0,53	1,00						
Weight	0,47	0,76	1,00					
BMI	0,08	-0,05	0,61	1,00				
Ideal weight	0,53	1,00	0,76	-0,05	1,00			
% Weight excess	0,09	-0,02	0,63	1,00	-0,02	1,00		
EAT Score	0,00	-0,22	-0,07	0,17	-0,22	0,16	1,00	
Physical activity coefficient	-0,10	0,05	0,09	0,07	0,05	0,08	-0,11	1,00

Table no. 3 – The correlation coefficients between tested parameters in boys

	Age	Height	Weight	BMI	Ideal weight	% Weight excess	EAT Score	Physical activity coefficient
Age	1,00							
Height	0,43	1,00						
Weight	0,21	0,68	1,00					
BMI	-0,09	0,08	0,78	1,00				
Ideal weight	0,43	1,00	0,68	0,08	1,00			
% Weight excess	-0,13	0,01	0,73	1,00	0,01	1,00		
EAT Score	0,09	-0,17	-0,02	0,12	-0,17	0,12	1,00	
Physical activity coefficient	-0,06	0,04	-0,07	-0,14	0,04	-0,14	-0,21	1,00

Table no. 4 – The correlation coefficients between tested parameters in girls

The analysis of the results suggests that there are moderate correlations between various parameters, the majority of these expressing data scientifically confirmed long ago (for example between height and weight) or being the result of the used methodology (between weight and BMI, between the weight excess and weight, between BMI and the weight excess etc.).

Analyzing the simple correlations between the nutritional status, the attitude towards alimentation and the physical activity regime we observe reduced values for both sexes, fact that signifies the existence of a less

coherent, less structured lifestyle among adolescents. More concretely, adolescents do not define clearly and in detail the dimensions of a healthy life, performing in an inconsistent and sometimes alternative manner elements such as the physical exercise (under double aspect, quantitative and qualitative) and a balanced diet, both factors reflecting at the nutritional status level.

Adolescents' attitude towards the physical exercise and/or balanced diets is influenced also by the information from mass-media, which promotes a certain ideal of body beauty, efficient pseudo-regimes for losing weight or for body remodeling, training and bodybuilding patterns etc.

4. CONCLUSIONS AND PROPOSALS

□ In order to win the battle against degenerative chronic diseases we must give up the lethal excesses of our usual alimentation. We must adopt a simpler and more natural diet, in the context of avoiding sedentariness, namely of adopting an active life regime from a physical point of view.

□ Due to the fact that the Romanian population occupies a significant place in the world regarding obesity, by means of this project we intended to draw the attention on the nutritional unbalances present at adolescents, associated with the reduction of the physical activity during this critical period for future adults forming.

□ The attitude towards alimentation and the physical activity are factors connected to the lifestyle and behavior, having an important role in the etiology and prophylaxis of numerous chronic diseases. Also, these factors are involved in the prevention of overweight and obesity and in maintaining the body weight in the normal physiological limits. More over, the studies related to the physical activity and to the alimentary share show the impact of these factors on health and functional status, reflected especially at the age extremes (young and old people).

□ The results of the performed study indicate the fact that, in general, the boys' and girls' morphologic profiles from the studied sample are framed in the standards for the respective age group, the differences related to sex being within the physiological limits specific to the organism's post puberty maturation.

□ The data recorded in boys' sample suggests in average a good nutritional status and a good physical activity regime in the context of a good attitude towards alimentation. Nevertheless there are large variations at the lot level, between weight deficit, overweight and obesity.

□ At the girls' group level there are similarities, as well as differences as compared to boys, regarding the tested parameters. In ensemble, girls' sample distinguishes by a more reduced physical activity regime as compared to boys' group, in the conditions of slight weight excess and of a good attitude towards alimentation. In other words, the differences induced by gender among adolescents are based especially on the physical activity regime and less on the alimentation type (and implicitly on the nutritional status).

□ The gender induces modifications at the nutritional status level, in the context of a certain type of attitude towards alimentation and physical activity regime ($p \leq 0,05$).

□ Adolescents' weight increase appears as a complex and dynamic phenomenon, correlated with the physical activity regime and with the alimentary habits (attitude towards alimentation).

□ In the main we can appreciate that there is a possibility for improving the attitude towards alimentation for the adolescents of both genders, considering the organism's type of solicitation and the morpho-functional particularities related to sex.

□ We note at boys' group level a more increased frequency of overweight and obesity (12%) as compared to girls' group (10%).

□ We have determined reduced correlations between the nutritional status, the attitude towards alimentation and the physical activity regime for both sexes, fact that signifies the existence of a less coherent, less structured lifestyle among adolescents.

BIBLIOGRAFY

1. Ciucurel, C. (2005), Fiziologie, Editura Universitaria, Craiova.
2. Ciucurel, C. (2008), Bazele anatomice și fiziologice ale mișcării, Editura Universitaria, Craiova.
3. Dumitru, G. (1997), Sănătate prin sport pe înțelesul fiecăruia, Federația Română Sportul pentru Toți, București.
4. Epuran, M. (2005), Metodologia cercetării activităților corporale, Ed. FEST, București.
5. Garner, D. M., Garfinkle, P. E. (1979), The Eating Attitudes Test: An index of symptoms of anorexia nervosa, Psychological Medicine, 9: 273-279.

6. Loud, K. J., Hergenroeder, A. C. (2008), Guidelines for Physical Activity and Sports Participation, In: Neinstein, L.S., ed. Adolescent Health Care: A Practical Guide, Philadelphia PA: Wolters Kluwer/Lippincott Williams & Wilkins, 264-296.
7. Olinescu, R. M. (2004), Totul despre alimentația sănătoasă, Editura Niculescu, București.
8. Pearson, Natalie, Atkin, A. J., Biddle, S. J. H., Gorely, T., Edwarson, Charlotte (2009), Patterns of adolescent physical activity and dietary behaviours, International Journal of Behavioral Nutrition and Physical Activity 2009, 6 (45): 1-18.
9. Rogol, A. D., Clark, Pamela, Roemmich, J. N. (2000), Growth and pubertal development in children and adolescents: effects of diet and physical activity, American Journal of Clinical Nutrition, 72 (2): 521s-528s.