

THE PROBLEM OF PHYSICAL EDUCATION IN THE SERBIAN ARMED FORCES – NECESSARY CHANGES*

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The problem of a modern lifestyle is that it contributes to a reduction in movement, a change in diet and morphological profile, a decrease in physical fitness, as well as the occurrence of chronic non-communicable diseases. In the field of military education and training, in addition to the same consequences that occur in civilian structures, an additional problem is that physical education is based only on a motor component. The paper emphasizes the necessity of changes in physical education. The assumption is that the problem of hypokinesia and inadequate nutrition in society, including the armed forces as its inseparable part, is solved by introducing a morphological segment as an obligatory element in physical education, in addition to a motor component. The method of situation analysis has been implemented within relevant facts from scientific papers. The results indicate that basing physical education only on a motor component is insufficient to solve functional and certain health problems. It has been concluded that it is necessary to supplement the programme of physical education and training with a morphological and educational segment, which would contribute to the improvement of physical fitness, morphological status and the expansion of awareness of physical education as a permanent value.

Key words: physical education, physical fitness, morphology, body fat, armed forces, lifestyle

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Introduction

“Physical activity is one of the criteria for assessing health and physical inactivity has been identified as the fourth leading risk factor for general mortality” (IPHS BATUT, 2013: 42). Regarding a modern lifestyle, body mass increases over time, so it was necessary to define the measurement unit of being overweight, which has been done using body mass index (BMI). “The standard WHO (World Health Organization) classification is: malnutrition BMI<18.5 kg/m²; normal nutrition BMI=18.5-24.99 kg/m²; pre-obesity BMI=25.00-29.99 kg/m²; obesity (class 1) BMI=30.00-34.99 kg/m²; obesity (class 2) BMI=35.00-39.99 kg/m²; obesity (class 3) BMI≥40.00 kg/m²” (Dopsaj et al, 2018: 150). The term overnutrition or overweight includes pre-obese persons with BMI 25.00-29.99 kg/m² and obese with BMI over 30.00 kg/m². In recent decades, diseases that are not caused by virus and bacteria have also occurred. “The basic and main feature of morbidity and mortality in the modern world are chronic non-communicable metabolic diseases, whose spread is almost of a pandemic character, especially in the most developed countries of the world” (Nikolić et al, 2007: 45). The very name metabolic syndrome has been under scrutiny and redefinition during the past decades. “It is evident that at the basis of all the mentioned definitions there is a relation between obesity, lipid status, elevated blood pressure and plasma glucose values, in an effort to determine their relation to insulin resistance” (Nikolić et al, 2007: 46). “In the year preceding the survey, the greatest percentage of the population stated that they had high blood pressure (29.6%)” (IPHS BATUT, 2021: 41). “Overnutrition affects not only everyday life, but also greatly affects the working capacity and productivity of the population” (Dopsaj et al, 2018: 148). Considering foreign experiences, e.g. in the US, Crawford and other authors (Crawford et al. 2011: 35) mention that there is a great debate about the ideal body composition for military personnel, i.e. for optimising physical fitness and performance on the battlefield. In the scientific papers of foreign authors, you can find various values of the percent of body fat (BF% or PBF), which are taken as a limit value; for men 18% (Crawford et al. 2011: 35), 21% for men (Mullie et al, 2008: 266), 25% for men and 30% for women (Heinrich et al, 2008: 67) and 26% for men and 36% for women (Yaffea et al, 2014: 113), and the device that analyses body composition (from Inbody series) is defined so that the normal value of body fat for men is 15%, and for women 23%.

In an institution such as the armed forces, physical fitness is a professional obligation that is evaluated by the Physical Fitness Test (PFT), and health status is verified by a mandatory periodic medical examination. The problem of excessive body mass or weight is evaluated indirectly by the mentioned PFT, where only a motor component is considered, so if a candidate or examinee does not pass PFT, they should understand that one of the main causes of failure is their morphological status.

The objective of this paper is to emphasize the mode of accepting modern work technology in solving the growing problem of hypokinesia and morphological changes in body status, in order to avoid health, working and functional problems. Therefore, it would be necessary to initiate the institutional dealing with the problem of morphological status within the selection in the Serbian Armed Forces (SAF), physical education classes (PEC), physical training (PT) and physical fitness tests at all levels.

The established system and relevant results

“In the Republic of Serbia, from 2017/2018 school year, for fifth grade students, instead of the subject of physical education, a new subject was introduced, whose name was changed to Physical and Health Education, in accordance with the request of the Ministry of Education, Science and Technological Development, which has conditioned the “incorporation” of content from health education into the programme” (Radisavljević, Janić, 2019: 62). “The teaching and learning objectives of all subjects for fifth grade students are new and defined in such a way that the focus has shifted from the content of learning to the purpose of learning” (Radisavljević, Janić, 2019: 63).

Within military education, physical education (P.E.) classes are organized at all levels of schooling, so that the Military High School students who continue their education at the Military Academy have physical education classes eight years, from the age of fifteen to twenty-three.

On the basis of the 2009 research of the Republic Institute of Sport (RIS), the physical development and physical fitness of primary school-aged children for the period from 1995 and 2009, for ages 7 to 14, are: physical development – male students are taller than their peers from 1995 by 3% on average and female students by 2.5% on average; body mass increased by 14% on average in male students, and by 11% in female students; body mass index in male students increased by 7.3%, and 5.6% in female students; physical fitness recorded a drop in value in male students by 6%, and 12% in female students.

In their paper, Pajić et al. (2016) state that 15% of children in Serbia are obese and the average value of BMI in the population of school children is 26 ± 4.74 kg/m². “The highest prevalence of overnutrition or obesity is registered in southern European countries in Spain (27% of children and adolescents), Italy (36% of children aged nine) and Greece (26% of boys and 19% of girls aged six to seventeen)” (Pajić et al. 2016: 109).

Table 1 presents the results of the morphological profile and motor skills of the Military High School (MHS) students. Each generation of students was measured and tested twice - in 2012 and 2013. It can be noticed that the value of the percent of body fat (PBF) decreases in the second measurement, i.e. at the end of the school year (for the 1st year from 11.64% to 11.52%). Body mass index (BMI) increases progressively during schooling, from 20.83 kg/m² at the beginning of the first year, to 22.89 kg/m² at the end of the third year and finally 22.86 kg/m² at the end of

schooling. At the same time, the number of pull-ups (PU) increases from 5.4 in the first year to 12.27 at the end of the 4th year, and the result of 1600 metres running improves from 427.88 to 363.35 seconds.

Table 1 – *The change in the morphological profile and motor results of the Military High School students (N 255)*
(The table taken from the paper by Glavač et al. 2015a)

The results of morphological variables for the students of the Military High School measured in 2012 and 2013

Variables	Study grades											
	I			II			III			IV		
	2012 x ± SD	2013 x ± SD	Δ	2012 x ± SD	2013 x ± SD	Δ	2012 x ± SD	2013 x ± SD	Δ	2012 x ± SD	2013 x ± SD	Δ
Morphological												
AC (cm)	76.66 ± 6.17	81.46 ± 7.12**	4.80	79.23 ± 6.49	82.71 ± 6.56**	3.48	79.94 ± 5.39	83.55 ± 6.08**	3.58	81.80 ± 5.71	81.46 ± 5.26	-0.34
BH (cm)	176.91 ± 6.48	179.10 ± 6.48**	2.18	178.14 ± 6.09	179.25 ± 6.34**	1.11	179.47 ± 6.36	180.07 ± 6.34	0.59	179.31 ± 6.45	180.03 ± 6.49	0.73
BM (kg)	65.24 ± 8.79	69.64 ± 9.07**	4.40	68.47 ± 9.10	70.09 ± 8.36**	2.45	71.53 ± 8.70	74.33 ± 9.05**	2.79	74.04 ± 9.94	74.15 ± 9.12	0.11
BFM (kg)	7.77 ± 4.00	8.19 ± 3.85	0.42	7.87 ± 4.44	7.27 ± 3.98	-0.60	8.75 ± 4.47	8.74 ± 4.22	-0.01	9.73 ± 5.28	7.79 ± 3.87**	-1.94
SMM (kg)	32.26 ± 4.07	34.76 ± 4.30**	2.50	34.22 ± 3.76	36.22 ± 3.76**	2.00	35.63 ± 3.72	37.4 ± 4.11**	1.61	36.70 ± 4.37	37.94 ± 4.37**	1.24
PBF (%)	11.64 ± 4.43	11.53 ± 4.37	-0.12	11.15 ± 4.91	9.94 ± 4.68**	-1.21	11.93 ± 4.59	11.55 ± 4.25	-0.38	12.80 ± 5.10	10.31 ± 4.21**	-2.49
SMI (kg/m ²)	20.83 ± 2.53	21.69 ± 2.40**	0.86	21.57 ± 2.57	22.08 ± 2.38**	0.50	22.21 ± 2.46	22.89 ± 2.40**	0.69	23.01 ± 2.68	22.86 ± 2.37**	-0.15
PSMI (%)	49.53 ± 2.57	50.01 ± 2.58*	0.46	50.17 ± 2.92	51.22 ± 2.75**	1.04	49.96 ± 2.56	50.22 ± 2.50	0.27	49.74 ± 2.62	51.27 ± 2.54**	1.53
VFA (cm ²)	29.54 ± 17.81	32.02 ± 19.31	2.48	30.16 ± 22.67	26.42 ± 20.00*	-3.74	33.61 ± 20.67	34.15 ± 20.39	0.54	37.74 ± 23.18	38.31 ± 19.99**	-0.23
TW (L)	2.18 ± 4.95	45.06 ± 5.20**	2.88	44.36 ± 4.55	46.68 ± 4.53**	2.32	45.74 ± 4.86	47.95 ± 5.05**	2.21	47.13 ± 5.37	48.70 ± 5.45**	1.57
Motor												
PU (n), x ± SD	5.40 ± 4.42	6.53 ± 4.16**	1.13	8.55 ± 5.17	10.05 ± 4.87**	1.50	9.98 ± 4.33	11.65 ± 4.03**	1.67	12.24 ± 4.28	12.27 ± 4.07	0.03
SU (n), x ± SD	43.09 ± 7.17	50.29 ± 5.25**	7.21	46.69 ± 4.77	48.38 ± 5.01*	1.69	51.93 ± 6.01	51.65 ± 6.61	-0.28	50.89 ± 6.02	50.51 ± 4.21	-0.38
SLJ (cm), x ± SD	205.96 ± 21.35	219.57 ± 17.36**	13.62	222.41 ± 15.77	231.41 ± 17.39**	9.00	230.04 ± 16.28	239.17 ± 17.18**	9.13	240.65 ± 15.90	243.22 ± 16.83	2.57
1.600 m run (sec)	427.88 ± 43.88	389.54 ± 27.68**	-38.34	374.88 ± 59.81	376.58 ± 31.22**	1.70	367.61 ± 25.21	364.04 ± 26.58	-3.57	372.03 ± 31.38	363.35 ± 26.50	-8.68

AC – abdomen circumference; BH – body height; BM – body mass; BFM – body fat mass; SMM – skeletal muscle mass; VFA – visceral fat area; TW – total water; PBF – percent of body mass; BMI – body mass index; PSMI – percent of smooth muscle mass index; PU – pull-ups; SU – sit-ups; SLJ – standing long jump; n – number; Δ – mean difference; x ± SD – mean ± standard deviation; *p < 0.05; **p < 0.01.

Table 2 – *The comparison of the morphological types of Greek and Serbian cadets*
(Adapted from the doctoral thesis, Glavač, 2015b and Spartali et al, 2014)

KADETI VOJNE AKADEMIJE				
SRBIJA (S) N 489 i GRČKA (G) N 868				
PBF i BMI	BMI < 25 kg/m ²		BMI ≥ 25 kg/m ²	
	N	%	N	%
< 15 PBF	istinski pozitivni (IP)		lažno negativni (LN)	
	S 303	61,96%	S 63	12,88%
	G 532	61,30%	G 148	17,00%
≥ 15 PBF	lažno pozitivni (LP)		istiniski negativni (IN)	
	S 45	9,20%	S 78	15,95%
	G 38	4,30%	G 150	17,30%

Table 2 lists the percentage values of the representation of the morphological types in relation to BMI and PBF of the cadets of the Military Academy in Greece (Spartali et al, 2014) and Serbia. There are four types - true positive (TP), BMI less than 25 kg/m² and PBF less than 15%; false positive (FP), BMI less than 25 kg/m² and PBF equal to and higher than 15%; true negative (TN), BMI equal to and greater than 25 kg/m² and PBF equal to and higher than 15%; false negative (FN), BMI equal to and higher than

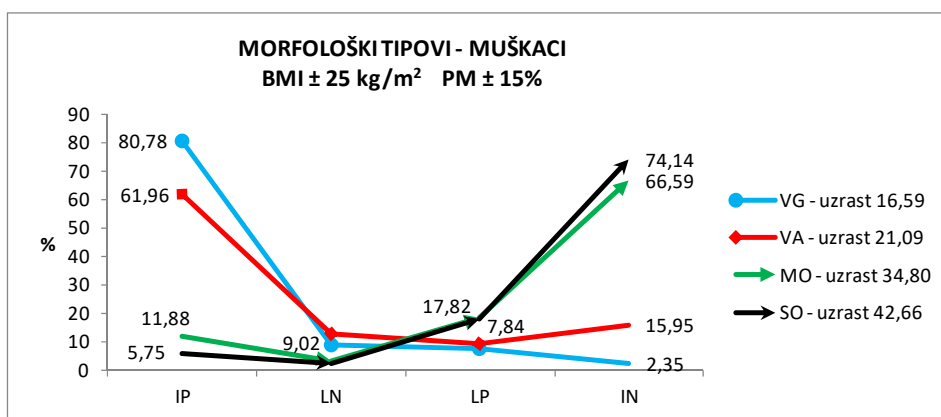
25 kg/m² and PBF less than 15%. In the TP type, the same percentage is noticed - 61.96% and 61.30% of the cadets from Greece and Serbia, while in the FP type, a twice lower percentage of Greek cadets is noticed - 4.30% vs 9.20%.

In Table 2, in the paper by Dopsaj and other authors (2015), you can see the morphological characteristics of the physically active students of Belgrade University (BU). Body mass index (BMI) for men is AS 24.54±3.60 kg/m², and the percent of body fat AS 12.91±6.04%. For girls, those values are – 21.71±3.10 kg/m² and 23.80±6.54%.

Table 3 – *Body mass index (BMI) and body fat percentage (BF%) in the MA members*
(Table adapted according to data from the doctoral thesis, Glavač, 2015)

GRUPA	N	AS BMI (kg/m ²)	SD BMI (kg/m ²)	AS BF%	SD BF%
Učenci VG	255	21.78	± 2.52	10.71	± 4.36
Kadeti VA	489	23.99	± 2.20	12.28	± 4.55
MO 30 - 39 god.	446	26.54	± 3.08	20.71	± 5.69
SO 40 - 50 god.	174	27.04	± 2.83	22.04	± 4.73

Table 3 lists data on BMI and body fat percentage (BF%) for the MA members (MHS – students, MA – cadets, JO – junior officers, SO – senior officers). A progressive increase in BMI and BF% can be noticed from the age of high school students to the fifties.



Graph 1 – *The morphological types of the MA members (N 1384)*
MHS – students; MA – cadets; JO – junior officers; SO – senior officers
(Adapted from the doctoral thesis, Glavač, 2015)

Graph 1 shows the distribution of the morphological types within the MA, and in relation to the limit value of BMI and the percent of body fat (PBF), as in Table 2. The TP type includes 80.78% of the MHS students and 61.96 of the MA cadets, while officers are the opposite type, TN with 74.14% and 66.59%. Furthermore, it has to be noted that only 2.35% of students belong to the TN type, and also 15.95% of cadets who are only a few years older.

Table 4 – *The prevalence (%) of the BMI (kg/m²) of the working population*
(Adapted from the original table from the paper by Dopsaj et al. 2018)

Group	Underweight	Normal weight	Overweight	Obese type I	Obese type II	Obese type III	
	< 18.49	18.5-24.99	25-29.99	30-34.99	35-39.99	40-49.99	50+
Women 60-65 years	0.0	19.7	36.8	25	9.2	6.6	2.6
Men 30 - 40 years	0.0	22.6	57.5	14.6	3.7	1.5	0.3
Men 40 - 50 years	0.0	19.2	56.7	18.2	4.4	1.6	0.0
Men 60 - 65 years	0.0	25.8	45.2	16.1	8.1	4.8	0.0

Table 4 shows the results of the BMI prevalence by rank among the working population in the Republic of Serbia (RS). When it comes to women aged between 60 and 65, the prevalence of overnutrition with BMI of 25 to 29.99 kg/m² occurs in 36.8% of cases, while in cases of BMI over 30 kg/m² the prevalence is 43.4% (25 +9.2+6.6+2.6). When it comes to men, aged between 30 and 40 and 40 and 50, the prevalence of overnutrition with BMI of 25 to 29.99 kg/m² occurs in 57.5% and 56.7% of cases, and BMI greater than 30 kg/m² in 20.1% and 24.2% of cases.

Table 5 – *The morphological status – the SAF officers, the working population of the RS, the Police of the RS*

(Adapted from: Glavač, 2015, Dopsaj et al., 2018, Vuković et al., 2022)

GRUPA	Prekomerno uhranjeni	
	Predgojaznost (%) BMI 25-29.99 kg/m ²	Gojaznost (%) BMI 30-34.99 kg/m ²
MLAĐI I STARIJI OFICIRI (N 620) UZRAST 30 do 50 god.	59% 27,13 kg/m ²	12,58 % 32,16 kg/m ²
RADNO AKTIVNO STANOVNIŠTVO RS 30 do 40 god.	57,50%	14,60%
RADNO AKTIVNO STANOVNIŠTVO RS 40 do 50 god.	56,70%	18,20%
POLICIJA RS (N 277) UZRAST 34.3 ± 6.9 god.	27,69 kg/m ²	/

On the basis of the available data, Table 5 presents an overview of BMI values, as well as the percentage representation of the overweight officers of the Serbian Armed Forces, the working population of the RS and the professional members of the Police of the RS. In the pre-obesity category, a similar result is indicated in all samples.

Discussion

For decades, in physical education programmes, with the exception of the recent classes in Physical and Health Education in primary schools, a motor component in the cognitive, training and organizational sense has been represented as an obligatory element. Despite the growing problem of modern living, life habits, as well as morphological status are not a subject of interest in the educational system of the Serbian Armed Forces.

“Morphological and motor dimensions do not represent isolated factors, and have to be considered within a complete system, which make a person a special biopsychosocial entity, therefore their extraction and measurement is difficult” (RIS, 2009: 9). The research related to physical status also applies to children and needs to be carefully analysed and further steps taken to improve the situation. “Thus, it can be noticed that 30% of the total sample of children is covered by the condition of pre-obesity, as well as that 8% of children are obese” (Pajić et al, 2016: 109). If there is likelihood that during childhood adequate life habits will trace the correct path to adulthood, then greater efforts should be made to use key opportunities for such an action, including school system (Hills et al, 2014: 6). In the 2009 RIS report, it is mentioned that in fifteen years body mass of boys increased by 14% on average, and 11% in schoolgirls, while physical fitness decreased by 6 and 12%. “Life habits, which include adequate nutrition, appropriate physical activity and non-smoking, are the most important preventive measures for leading healthy life. Such habits are acquired at an early age and are influenced by parents, as well as the immediate vicinity of peers, and are strongly related to socio-economic conditions and education” (Uvacsek et al, 2014: 321). “The primary goal of the educational field of physical education is to acquire the habit of regular physical exercise in children. For physical education, family is also one of the important factors because the first attitudes and the first knowledge about the significance and value of physical culture are established in it” (Grandić et al, 2018: 61). “Many children in the United States suffer from obesity, with one-third of the US children and youth being overweight and 17% of children aged between 2 and 19 being obese”. Furthermore, “the experiences of stigmatisation due to weight indicate that life quality is impaired, especially among young people” (Pont et al, 2017: 1). On the one hand, lifestyle leads to obesity, and on the other hand, the media and social models of perfect look and body cult are imposed, which leads to definite differences between the real and desirable, and thus to frustration. So what can school system do? “The average duration of physical education classes is about 38 minutes. Only 30 minutes are devoted to exercising, and students actively use only nine minutes. It has also been noted in the US that students are active only 8.6% of the total class time” (Pavlović, 2020: 59). Table 1 presents the results of the morphological characteristics and motor skills of the MHS students. The values of BMI and skeletal muscle mass (SMM) progressively increase from

year to year during schooling within the limits of proper development, while at the same time the percent of body fat (PBF) is in a controlled range and decreases during school year. During schooling, the results of motor skills also improve. It can be concluded that the results of the MHS students during four years of schooling represent a morphological and motor paradigm.

Table 2 presents the comparative results of the morphological types between the cadets in Greece and Serbia. In relation to climate, as well as specific conditions in which the cadets of the Military Academies live, it can be noticed that the TP morphological type is the most represented in percentage terms, with 61%, as well as the opposite to it, TN with a similar percentage of 15.95% and 17.30%. From Graph 1, it can be noticed that the percentage of the TN among students in the MHS is 2.35%, among cadets, four years later, that percentage has increased to about 16%, and among adults it is over 70%. In addition to the changed morphological status, functional capabilities, and also health status, should be related to this. In their paper, Nikolić et al, (2007) state that probability of getting metabolic syndrome increases if people are under the influence of several risk factors, namely obese people and those who lead a sedentary lifestyle, older than 40, etc. Furthermore, "a prospective study of 140 army recruits has shown that a 1% increase in body fat shortens the 12-minute running distance by 19.3 metres" (Crawford et al. 2011: 35).

In relation to civil structures, "it is assumed for the student population that they are healthy and no research has been conducted for many years regarding their habits, behaviour, health problems. In recent decades, it has been realized that young people are under high expectations, at the same time they often neglect their health, they often reach for alcohol and tobacco, they eat poorly, they rarely do sports" (Macanović et al, 2013: 140). Comparing the results of BU students from the paper by Dopsaj et al. (2015) with the results of the MA cadets from Table 3, a similarity can be noticed. The BMI value for BU students is $24.54 \text{ kg/m}^2 \pm 3.60$ vs $23.99 \text{ kg/m}^2 \pm 2.20$, and the percent of body fat for students is $12.91\% \pm 6.04$ vs $12.28 \text{ kg/m}^2 \pm 4.55$. The values of students who independently organise physical activity are slightly higher, while cadets have organised physical education classes as mandatory. The influence of previous classes in primary and secondary school on the further execution of physical activity can be considered. If physical education teachers in primary and secondary school worked well with their students, they would develop their positive attitude towards regular physical activity, so they have continued to do what they learned during such schooling (Stanković et al, 2018: 77). The research on the access to teaching content during schooling is related to this. "The deep approach is characterized by intrinsic motivation based on interests and the need for competence and a learning strategy that supports learning with understanding. The surface approach is defined by instrumental motivation that encourages the rapid achievement of goals with as little effort and risk as possible and a learning strategy aimed at reproducing coursework and learning what is most necessary" (Lazarević, Trebješanin, 2013: 300). The question arises whether

physical education classes are reduced to a craft-mechanic-training process, where only locomotor system is engaged, or should a conscious component be included, so that the implications of physical education are retained even after schooling?

An inspiring study has been conducted by Helmer and other authors (2012) with German students. In addition to a survey on life habits, they also defined beliefs about health status - an internal and two external, in relation to authority and chance. Therefore, certain people have their beliefs about health status (ILOC - Internal locus of control), others trust external authorities more (PLOC - Powerful others locus of control), and the third ones believe that a health problem is the result of chance (CLOC - Chance locus of control). It has been proved that people with the concept of ILOC are more engaged in physical activities and take care of proper nutrition, people with the concept of PLOC are more inclined to take medicines and rely on the advice of doctors, while people with the concept of CLOC consume alcohol more often. In Serbia "research shows that there is an increasing trend in the number of young people, especially among the student population, who are dominated by life habits characterized as unhealthy" (Nešić et al, 2016: 5). Furthermore, Nešić et al. (2016) emphasize that a healthy active lifestyle, in addition to physical activity, also includes proper nutrition, regular preventive medical examinations, control of pressure and stress, elimination of alcohol and smoking. "Globally, obesity has increased by 7.6% in men and 8.5% in women over the last forty years. The most overnourished Europeans with body mass index between 25.0 kg/m² and 29.9 kg/m² live in Greece (48.1%) and Spain (45.4%), and the least in Switzerland (37.9%)" (Dopsaj et al, 2018: 149).

The question arises of "educating adults about physical culture and its importance because only by developing the awareness and cognitive understanding of the value of physical activities of the entire student population we can improve the results of the overall level of their physical activities" (Malčić, Jurišin Marić, 2018: 22). In Serbia, the Physical education subject is not practiced or studied at faculties, except at a few specialized institutions, so the educational influence in this field ends with secondary school. "In this sense, the development of physical culture as a social phenomenon that has timeless values is necessary, and the degree of its development level is an indicator of the development level of some society" (Malčić, Jurišin Marić, 2018: 22).

Equivalent to hygiene habits, which are formed from early youth and are understood as a permanent value until the end of life, an educational system should be established so that the implications of physical education are understood as a permanent value, and not only while a student is in school system. Such an understanding is not new because the Latins made the proverb "*Non scholae sed vitae discimus*" (We do not learn for school, but for life), but the problem is how to incorporate such an educational process into a permanent form, especially in the challenging times of a modern lifestyle.

The MA cadets in boarding schools are subject to norms that are consistent with desirable life habits, in terms of work schedule, rest and nutrition. The question is whether, due to this, the cadets will develop the concept of trust in authority, that is, in

the system, which would correspond to the PLOC concept, or whether the self-control mechanism will be activated and the ILOC concept will develop. Within the MA, several generations of students are educated, and from Table 3 one can see an increase in BMI, with a note that the increase in the MHS students refers to an increase in lean mass, while from the age of cadets, the increase refers to a rise in a fat component. Graph 1 presents the review of the morphological types (TP, FP, FN, TN) among members of the MA educational system, which is also a representation of the morphological development path. Junior and senior officers, who were classified as undesirable types (TN and FP), when they were the MHS students and the MA cadets belonged to desirable types TP and FN, i.e., following the logic of development, it can be reasonably assumed that the current part of students and cadets will also move to the morphological types TN and FP during their career at a mature age, which should not happen and that can be a limiting factor in some professions, such as, for example, military pilots. Namely, "an aircraft with excessive weight, or one whose centre of gravity (CG) is out of the permissible limits, is inefficient and dangerous to fly. The responsibility for proper weight and balance control starts with an engineer and designer and extends to a pilot who operates and a technician who maintains aircraft" (Sarić et al, 2016: 1). In the US Armed Forces, it has been noticed that there has been a great change in the body mass of its members. "An increase was recorded from 1998 to 2008 from 25,000 to 70,000" (Crawford et al, 2011: 36).

Table 4 presents the results of the civilian population by rank, and Table 5 presents BMI values in two categories with an additional sample for comparison. 59% of officers, as well as 57.50% and 56.70% of civilians, are pre-obese with BMI of up to 29.99 kg/m². In addition, police officers and army officers have the same percentage of BMI - 27.69% and 27.13 kg/m², which implies that the consequences of a modern lifestyle spread indiscriminately to all structures of society. This picture is completed by data on PBF, as well. Table 3 shows the amount of PBF for officers of 20.1% and 22.04%, while the paper by Vuković et al (2022) provides PBF data for the Police of the RS in the amount of 21.18±5.95%, which further confirms the great similarity in the results. In the same paper, there is data on PBF according to the Police subgroups. The Special Anti-Terrorist Unit members aged 32.7±4.9 years have the lowest amount of PBF – 17.71±4.73%, Table 4, (Vuković et al (2022: 52). It should be mentioned that officers are obliged to attend regular physical training classes, as well as to pass annual physical fitness tests, while civilians do not have this obligation. However, the results of their morphological status are similar, and the results are similar for cadets and students. In his doctoral thesis, Glavač (2015) suggests a review of the influence of education during schooling, which should have positive effects in professional service after schooling, as well. In addition, a statistically significant negative correlation has been found in the MA members between a fat component and physical fitness, which progressively increases with the age of students $r = -0.35$; $r = -0.39$ for the age of cadets, $r = -0.53$ for the age of junior officers up to 40 and $r = -0.48$ for the age of senior officers up to 50. In this regard, adequate measures in the Serbian Armed Forces units should ensure the continuation of the school's educational influence on

the establishment of adequate life habits in the field of nutrition and physical activity. Considering the leadership concept of a subordinate system such as the Armed Forces, it would be necessary to introduce theoretical classes of physical education into other types of officers' education, such as the School of National Defence, which would actually additionally educate the management personnel on the methodology of work in the sphere of physical education.

In the doctoral thesis by Glavač (2015), within the morphological development path, PFI coefficient, which represents the ratio of protein and fat, has been detected. From the age of cadets to the older population, a decrease in PFI in the amount of 0.065 per year leads to the equalisation of the amount of body fat and protein mass around the age of 31 (PFI is 1.00). With aging, PFI coefficient decreases, that is, body fat increases. In relation to the morphological status and process, the critical period in the change of the morphological profile is the period from the graduation from the Military Academy to the age of 31. This indicates that a great change in the morphological status directly continues to the previous education, so that the question of influence, synergy and continuity of education in school system, which refers to physical education and obligation relations regarding the physical training of the youngest officers in the Serbian Armed Forces units, is raised.

It has to be emphasized that BMI categorization is standardised and accepted in the world, but the percent of body fat has not been established as an acceptable standard in the Armed Forces. In Graph 1, about 70% has been detected in the undesirable morphological type, because the limit value for the percent of fat is 15%, which is a serious criterion requirement. If the value was raised to 18 or 20%, the situation would be better. Therefore, in the following period, the limit value of the percentage amount of a fat component should be defined for the categories of students, cadets and officers, which would be acceptable for the Serbian Armed Forces members and usable during selection, classes within school system and physical fitness tests, which would further encourage other activities to improve all implications of physical education.

Conclusion

In the Republic of Serbia, the problem of morphological development has been recognised, so from 2017/2018 school year a new subject has been introduced in elementary schools - Physical and Health Education. In the Serbian Armed forces, physical education and training is mandatory at all levels of education, as well as for professional military personnel, but still worrying findings are obtained.

Additional research is necessary to define a morphological-motor-health development model, which would most effectively correlate the ratio of BMI and BF% with the level of motor skills and health status.

Considering the fact that the greatest increase in a fat component has been recorded in the youngest officers up to the age of 31 and that during career the

amount of fat increases to values that have a negative impact on functional capabilities and health status, it is necessary to:

- define the acceptable percent of a fat component for students, cadets and professional military personnel within the Serbian Armed Forces;
- introduce adequate theoretical classes of physical education in the School of National Defence, so that commanding officers can learn how to solve the problem of physical education in units; and
- introduce morphological status as a mandatory element in the selection of candidates, teaching and testing of physical fitness.

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Summary

A modern lifestyle imposes, for a long time, new rules that are reflected in the reduction of movement and the disturbance of the quality of human nutrition, which leads to consequences for health, morphological status and reduction of physical fitness. The negative phenomena of a modern lifestyle are detected both in children and teenagers and are reaching the proportions of an epidemic recorded around the world. Among the working population in the Republic of Serbia, aged between 30 and 40, 57.5% of citizens are overweight (BMI from 25 to 29.99kg/m²) and between 40 and 50 - 56.7%. When it comes to members of foreign armies, an increase in body fat and a changed morphological status with accompanying consequences has also been noticed. Even among members of the Serbian Armed Forces, which is an inseparable part of society, the problem of morphological status is evident. The Military High School students are an example of good body composition and proper development during schooling, but already from the cadet level, an increase in body fat has been recorded, while the percent of body fat in junior and senior officers is 20.71% and 22.04%. It can be concluded that the Military High School students are a paradigm of body structure, which is slightly disturbed during the period of cadets, and further during their career, a great percentage of officers are classified into undesirable morphological types. Considering that physical education in the Serbian Armed Forces is represented during eight years of schooling and that physical training and physical fitness test is current throughout career, the question of the quality of the educational impact arises, because similar results of morphological status expressed through BMI have been recorded in the working population in Serbia, who had physical education only up to the high school level. Due to the consequences of a modern lifestyle, the authorities in the Republic of Serbia have reacted to the problem of the morphological status of children, so in elementary schools in 2017/2018 a new subject was introduced - Physical and Health Education, with a qualitatively new approach to education. The Serbian Armed Forces also have to accept the reality of the growing consequences of lifestyle and revise the programme and approach to physical education of students, cadets and professional military personnel. From the current level of implementation of physical education only through a motor segment, it

is necessary to expand the contents of teaching and training to an educational component and to expand the awareness of physical education as a timeless value and the importance of adequate life habits. It is necessary to make progress and improve the craft-training approach with an educational segment, by introducing morphological status as a mandatory element in the physical education system, and within that, define the limit value of BMI and the percent of body fat for members of all age levels of the Serbian Armed Forces.

Key words: *physical education, physical fitness, morphology, body fat, armed forces, lifestyle*

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