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AN IMPACT OF INTERVAL METHOD STRENGTH  
TRAINING ON PHYSICAL FITNESS AS AN ELEMENT  
OF SPECIAL RESPONSE UNITS<sup>1</sup> SCHOOLING

**Abstract**

The article is of interdisciplinary character, which is specific for new research discipline i.e. *security science (securitology)*. It is because security sciences are included in practical elements of security culture, which perfectly correspond with empiric search based on studies in physical culture, where there is no place for untestable in practice, highly speculative theories of doubtful quality. Members of antiterrorist units and other dispositional groups are officer, who daily risk their life so everyone else could safely work and then peacefully fall asleep. Such people requires hence a specialized preparation. It applies to both physical and psychological preparation on the highest level possible. The article is a result of researches related to physical activity and based on authorial program of interval training that, because of its efficiency, may be useful for specialized schoolings of dispositional groups members.

**Keywords**

dispositional group, security culture, physical culture, High Intensity Interval Training

**Introduction**

Article refers to specialized problematic, related to a phenomenon that is an important fragment of wider and wider

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<sup>1</sup> *Special response units* – special dispositional groups, in other words special units, e.g. anti-terrorist and desant specjalne units. Cf.: J. Maciejewski, *Grupy dyspozycyjne. Analiza socjologiczna*, WUW, Wrocław 2012; *Młádeż a armada*, Čukan K. (ed), MO SR, Bratysława 2005.

appearing in serious scientific discussions and elaborations of the *security culture*<sup>2</sup>. This phenomenon is subject of securitological studies<sup>3</sup>. Physical culture is an element that is part of building and constant reconstruction of some of defined models, brought along with security culture<sup>4</sup> – this is a phenomenon that accompanies people for centuries. For hundreds of years mankind have been creating and improve it intensively within the fight for surviving and development in both individual and group dimension. During the processes of building the security culture very early appeared specialized groups of people, who had adequate psychophysical predispositions and so called moral (and volitional) dispositions to perform active protection – once of their tribesmen, now – fellowmen. Contemporarily such teams are defined with the term

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<sup>2</sup> M. Cieślarczyk, *Kultura bezpieczeństwa i obronności*, Siedlce 2011, p. 40, 91; S. Jarmoszko, *Nowe wzory kultury bezpieczeństwa a procesy deterioracji więzi społecznej*, [in:] *Jedność i różnorodność. Kultura vs. kultura*, E. Reklajtis, R. Wiśniewski, J. Zdanowski (ed.), Aspra-JR, Warszawa 2010; B. Malinowski, *Naukowa teoria kultury*, [in:] *Szkice z teorii kultury*, Książka i Wiedza, Warszawa 1958, p. 69; J. Matis, *Socjalno-pedagogické aspekty prípravy bezpečnostného manažera*, „Securitologia” 2008, no. 7; J. Piwowarski, *Kultura bezpieczeństwa*, „Kultura Bezpieczeństwa. Nauka – Praktyka – Refleksje”, Apeiron WSBPI, 2012, no. 12; R. Rosa, *Filozofia bezpieczeństwa*, Bellona, Warszawa 2011; J. Świniarski, *O naturze bezpieczeństwa*, ULMAK, Warszawa 1997; J. Stańczyk, *Współczesne pojmowanie bezpieczeństwa*. Jurczak W., *Znannja w oblasti biepieki – skladowa czastina uniwersitetskoj osvieteli*, „Bezpieka żyttedzialnosti”, 2007, no 5. Pidgeon N., *Safety Culture and Risk Management in Organization*, Cardiff 1991.

<sup>3</sup> L. F. Korzeniowski, *Securitologia. Nauka o bezpieczeństwie człowieka i organizacji społecznych*, EAS, Kraków 2008, p. 23 and 33; J. Piwowarski, *Bezpieczeństwo jako wartość*, Wyższa Szkoła Bezpieczeństwa Publicznego i Indywidualnego „Apeiron”, Kraków 2010; F. Škvrda, *Vybrané sociologicke otázky charakteristiky bezpečnosti v súčasnom svete*, [in:] K. Čukan, a. kol. *Mládež a armada*, MO SR, Bratislava 2005, p. 41; L. Hofreiter, *Securitologia*, Akadémia ozbrojených síl gen. M. R. Štefánika, Liptowski Mikulasz 2006, p. 19; L. F. Korzeniowski, *Securitologia na początku XXI wieku*, „Securitologia”, 2007, no. 5, p. 186; J. Matis, *Socjalno-pedagogické aspekty prípravy bezpečnostného manažera*, „Securitologia” 2008, no. 7; В.И. Ярочкин, *Секьюритология – наука о безопасности жизнедеятельности*, Осъ – 89, Moskwa 2000; J. Janosec, *Sekuritologie – nauka o bezpečnosti a nebezpečnosti*, „Vojenské rozhledy”, 2007, no. 3.

<sup>4</sup> T. Ambroży, *Kultura fizyczna a bezpieczeństwo*, [in:] Zeszyt Naukowy „APEIRON” no. 6; J. Piwowarski, T. Ambroży, *The impact of physical culture on realization of human security need*, [in:] *Medzinarodny Vedecko-Odbrony seminar*, wydanie pokonferencyjne, Akademia Ozbrojenych Sil, Liptowski Mikulasz 2012, p. 294-303.

*dispositional groups*<sup>5</sup>, whereas their elite are undoubtedly special units, for instance antiterrorist units.

Physical and mental preparation of dispositional groups obviously required improvement of training methods for their members. This improvement was intensifying under the pressure of time, which is a parameter that, while facing the danger, becomes, along with a parameter of stress, of great catalytic meaning and this requires no further explanations. This is how the mankind began its purposeful activities for the physical culture and “in favor” of the security culture. We need to agree that it was much later, when the sport version of physical culture became an epiphenomenon of the culture security and defense. In all fairness – which is by the way of the security culture pillars – it has to be noticed that the sport pays its debt of gratitude to dispositional groups by offering them nowadays an enriched, in relation to a “rough” version, practical and theoretical apparatus of highly efficient training methods. An example is the *Kano paradox*. It caused improvement of the combat *ju-jitsu*, which has a medieval origin, by increasing possibilities of training martial techniques in sport training of *judo*. The same applies to methods of capacity preparations – with training of various kinds of stamina, and finally with strength training. An useful method for preparing members of dispositional groups, e.g. anti-terrorist units, are such forms of exercises as circuit training or interval training. Discussing the impact of this training on increase of some abilities of an anti-terrorist or a competitive athlete is the main part of this article that is supported by scientific researches of empirical character, which were carried out in the Institute of Security and Socio-Legal Studies of School of Higher Education in Public and Individual Security “APEIRON” in Cracow. *Notabene*, the preparation of an officer to perform direct counterterrorist actions suits, in general view, the conceptions of such physical training that are related to a specific form

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<sup>5</sup> J. Maciejewski, *Grupy dyspozycyjne. Analiza socjologiczna*, WUW, Wrocław 2012; *Securitologia – uwagi socjologa. Bezpieczeństwo w kontekście społeczno-kulturowym*, [in:] *Bezpieczeństwo a bezpieczeństwo wada*, Hofreiter L. (ed.), Akademia ozbrojonych sił gen. M. R. Štefaniká, Liptowski Mikulasz 2009;

of a decathlon. However it is a subject for much wider elaboration, while here focus is on the area defined in the topic of the article and discussing researches and findings associated to the course of the process of interval training, and an impact of such training on the participant's organism.

### **The interval training method. Description of the research experiment method**

During performing a short exertion (ca. 30 seconds), when there is no possibility of coming to an aerobic metabolism balance (steady state), the biggest cardiac ejection volume reaches the top after the end of the training. Close to maximal exertions (submaximal) work brings maximum effects of the heart function predominantly after several repetitions. The frequency of heart contractions reaches almost 180 beats per minute in the latest phase of work. The break time between consecutive repetitions lasted enough to reach 135 beats per minute. The method of such kind of training was called an interval method. A modern version of these exercises were developed by the group of scientist under the leadership of I. Tabata<sup>6</sup>. They have carried on an experiment that aimed to receive an answer for the question on an impact of prolonged moderate-intensity exercise and short-term maximal exercise on the aerobic and anaerobic capacity of organism. Examined were divided into two experimental groups. The first one for the time of 6 weeks for 5 days per week performed on the cycloergometer a training of intensity of 70% VO<sub>2</sub>Max in the main part, which lasted for 60 minutes, and 50% VO<sub>2</sub>Max in the warm-up part lasted 10 minutes. The second group also was planned to train in cycle of 6 weeks for 5 days per week on the cyclometer, however for 4 days that were exhausting trainings and the last, fifth, was dosed for 30 minutes and was not of high intensity (70% VO<sub>2</sub>Max). The previous four were of

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<sup>6</sup> I. Tabata, K. Nishimura, M. Kouzaki, Y. Hiray, F. Ogita, M. Miyachi, K. Yamamoto, *Effects of moderate-intensity endurance and high-intensity intermittent training on anaerobic capacity and VO<sub>2</sub>max*, "Medicine&Science in Sports&Exercise" 1996, Issue: Volume 28(10), p. 1327-1330.

supramaximal intensity and performed were with maximum capabilities. In the 1 Group  $VO_2Max$  was measured before and after the cycle as well as every once in a week during the program. The anaerobic capacity was ascertained in the fourth week and after the project. Experimental Group 2 right after warm-up on the same level and durability as the Group 1 has performed an exhausting effort that consisted of 7-8 series of exercises of supramaximal intensity. Every one of them lasted for 20 seconds and between them the examined were resting for 10 seconds. Anaerobic volume in Group 2 was ascertained before 2<sup>nd</sup> and 4<sup>th</sup> week and after the end of them, while the  $VO_2Max$  before 3<sup>rd</sup> and 5<sup>th</sup> week and right after the end of the cycle. In result after the end of bilinear six-week training cycle the experimental Group 2 had much larger growth of  $VO_2Max$ , which increased by  $0.7 \text{ ml} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$  and the anaerobic capacity increased by 28%. The first group of moderate and longer intensity had little increase in comparison to Group 2. Their data were:  $VO_2Max$   $53 \pm 5 \text{ ml} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$  do  $58 \pm 3 \text{ ml} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$ , while the anaerobic abilities increased statistically insignificantly. Hence received were data of new way of four-minute training (interval variant) that has sensational results.

The main purpose of this article is an attempt to define the impact of such strength training in the first experimental group GE.I (exercises with own body resistance) on the level of motor abilities in the scope of strength and aerobic stamina, with the background of a training of a shuttle run in the second experimental group GE.II.

Results of both groups are compared to results of the control group TK.

### **Methodology of conducted researches**

Research included following parameters:

- measurement of somatic features: body weight (kg), body height (cm);
- calculation of the weight-growth rate BMI;

- measurement of circumference of chest, arm, stomach, shoulder blade and thigh (in cm);
- measurement of adiposity of chest, arm, shoulder blade and thigh (in cm)
- measurement of efficiency with the Eurofit tests:
  - static force in hand – hand clenching (kg),
  - explosive force – long jump from standing (m),
  - functional force – bent arms overhang (s),
  - trunk strength – sit-ups from lying position (rep.),
  - speed – shuttle run 5x10 m (s);
- cardiorespiratory endurance – Cooper’s run (min.).

All necessary measurements were made by members of research team twice. It was done before the beginning of training cycles and right after the end of the authorial exercises.

### **Research questions**

In the work made was an attempt of answering four following research questions:

1. Is there any statistically significant difference in the scope of somatic features and motor abilities after 8 week training in group GE.I, GE.II and control group TK?
2. Is there any statistically significant difference in the scope of somatic features and motor abilities after 8 week training between groups performing the training GE.I and GE.II?
3. Is there any statistically significant difference in the scope of somatic features and motor abilities after 8 week training between the group performing the training GE.I and control group performing basic (standard) program of physical education (TK)?
4. Is there any statistically significant difference in the scope of somatic features and motor abilities after 8 week training between the group performing the training GE.II

and control group performing basic (standard) program of physical education (TK)?

The authors of this project feel obliged to inform at the moment of publicizing the course of researches and effects they have led to, that acceding to realization of the project used was own original and authorial program of training system. As a basis for this program in Institute accepted were rules elaborated by **Tabata Izumi**.

Formed were two experimental groups for which respectively used were symbols GE.I, GE.II. These groups were to perform three (3 t.u.) training units in every week-long mycrocycle. The planned duration of the experiment was eight weeks. Hence total number of training units was twenty four (24 t.u.).

Formed was third group that was to be a comparative reference system. Control group TK performed standard program of physical education lesson.

In the table I was presented authorial training program

Table 1. Conspectus of lesson unit including exercises for GE.I training

No.	Series	Description of the exercise/station
1.	20 sec. series of maximum exercise capacity 10 sec. break to change the station	Sit-ups from back lying position – abdominal muscles – e.g. by the ladder
2.	20 sec. series of maximum exercise capacity 10 sec. break to change the station	SP standing – supported squat – throwing legs to the back – back to supported squat – jump-up with arms above head – back to SP
3.	20 sec. series of maximum exercise capacity 10 sec. break to change the station	Abdominal muscles – From lying back leg lifts with bend and pulling knees to the chest
4.	20 sec. series of maximum exercise capacity 10 sec. break to change the station	From supported squat throwing legs alternately

5.	20 sec. series of maximum exercise capacity 10 sec. break to change the station	„Jumping Jacks”
6.	20 sec. series of maximum exercise capacity 10 sec. break to change the station	Bending arms in support lying forehead
7.	20 sec. series of maximum exercise capacity 10 sec. break to change the station	From lying back horizontal scissors
8.	20 sec. series of maximum exercise capacity 10 sec. break to change the station	From supported squat throwing legs to the back

Modified training plan for the second group GE.II: shuttle sprint run of length of the gymnasium touching the line with a foot. The same rules of number and duration of series as for GE.II. Control group (TK) – no activity. Standard program of physical education lesson.

Examined group consisted of adult men, students of School of Higher Education In Public and Individual Security “APEIRON” in Cracow, who aspire (group of people who expressed such declaration of will) to work in dispositional group of armed forces, police or other specialized uniformed formations. There are no persons who professionally do sport. Few cases of occurring recreational activities such as recreational strength training, football, basketball. The examined were stimulated with three trainings per week on every one of three lesson units per week of standard, 50 minutes duration. The general number of participants was 43. The first group GE.I consisted of 13 students, the second GE.II of 15 and TK group – 15 people. All of them were previously examined in terms of health. In examined groups were neither genetic nor acquired diseases. All participants were healthy and ready to begin an 8 week training mycrocycle. They were informed on proper diet during a short

lecture on basis hygienic and health principles. That were general information about prevail number of complex carbohydrates in diet and gaining energy mostly from them. All stimulant were prohibited. Recommended was regeneration during 7-8 hours of sleep and biological regeneration in every way possible. Reduced to minimum were other physical activities.

First examination of somatic parameters, Eurofit pre-tests and Cooper's run took place in the middle of February 2013, a week before the beginning of microcycle.

During somatic and motor features used were:

1. antropometer – length of the body;
2. body fat caliper – skin and fat folds;
3. anthropometric tape – circumference of muscles, long jump from standing;
4. medical scale – body weight
5. dynamometer – static force in hand
6. stopwatch with an accuracy of 0,001 sec. – straight arms overhang.

For 8 weeks assigned instructors performed training according to previously fixed rules (tab. 1). In case of sick leave or other random events, other instructor, who knew the subject of the experiment replaced him.

Before all measurements were done, demonstrated was with high precision how the exercise is to be performed or how one need to act during the somatic measurement.

General tool determining the level of increase or decrease of effort possibilities and level of fatness and musculature was a modified interval training. Detailed methods, which were to examine basis features of fitness before and after the microcycle, were motor tests. Methods of measurement were supposed to reveal changes of such motoric abilities. The aim was to show not only the force as a maximum moment, as in press of hand dynamometer, but also prolonged moment as in overhang on a stick or sit ups from lying position performed in an unit of time. In case of exertion applied was distance run that is a maximum capabilities in time of 12 minutes called the Cooper's test.

Detailed list of efficiency trials<sup>7</sup>:

1. long jump from standing as assessment of explosive strength;
2. trial of maximum local strength;
3. strength efficiency of abdominal muscles;
4. overhang on a stick in relation to functional strength of arms muscles;
5. shuttle run 10x5 meters with maximal speed and changes of direction in evaluation of locomotive speed;
6. Kenneth Cooper's test<sup>8</sup>.

For evaluation of the effect necessary were pre and post motor tests but also anthropometric parameters. Here is a list of measurable somatic features:

1. evaluation of skin and fat fold of the chest on the armpit fold grasped obliquely;
2. evaluation of nipple circumference of the chest in horizontal and parallel to the base way, crossing anthropometrical points such as thelion and lower angles of shoulder blades.
3. evaluation of skin and fat fold of arm triceps. Grip point ranges half of the arm length while the arm is freely lowered and the gripped fold runs vertically;
4. evaluation of the biggest arm circumference in maximal tense of muscles; Anthropometric tape applied in the biggest arm spot perpendicularly to its long axis. Arm in slight abduction;
5. evaluation of skin and fat fold of abdomen. Grip of fold obliquely in one quarter of distance between omphalion and iliospinal points;
6. evaluation of abdomen circumference. Measurement line runs parallel and horizontally to the base crossing the point of omphalion;
7. evaluation of skin and fat fold of front of the thigh. Vertical fold of skin along the front center line of thigh

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<sup>7</sup> H. Grabowski, J. Szopa, *Europejski test sprawności fizycznej*, AWF Kraków 1991.

<sup>8</sup> J. Talaga, *Sprawność fizyczna ogólna. Testy*, Zysk i S-ka, Poznań 2004.

- surface in half of its distance i.e. between the kneecap and crossing point of middle line of the thigh with inguinal line running along groin;
8. evaluation of the biggest thigh circumference in muscle tension. Position of the tape is horizontal and parallel do the base and run right below the groin and buttock ;
  9. evaluation of skin and fat fold right below the lower angle of shoulder blade in half of length between it and the spinal column;
  10. evaluation of the weight-growth rate body mass index that is being calculated by formula:  $BMI = \text{body mass (kg)} / \text{body height (m)}^2$ .

### **Research findings and discussion**

Results of researches on somatic and functional elements are presented in the table 2

“HIIT” training [*High Intensity Interval Training*] is defined as training of high-intensity exertion that is above 90% of HR max intermitted with regenerative sessions of low intensity character became highly exploit by athletes of many sport disciplines in past few years. It may also be used by those, who undertake recreation physical activity, but well prepared by initial training. Volume of the effort may vary from four even to thirty minute. Training may be realized in form of run, cycling, as well as strength training. Performing this training with resistance does not cause muscle hypertrophy<sup>9</sup>.

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<sup>9</sup> M.J. Gibala, S.L. McGee, *Metabolic Adaptations to Short-term High-Intensity Interval Training: A Little Pain for a Lot of Gain?* w: Exercise and Sports Sciences Reviews 2008, Vol. 36, No. 2, p. 58-63.

Table 2. Changes of average value of parameters of circumferences (cm), and adiposity (cm), BMI (kg/m<sup>2</sup>) and efficiency in turn of 8 week microcycle in examined groups and control group.

Group GE I (strength/endurance exercises) before and after the microcycle		Group GE II (Sprint) before and after the microcycle		Control group before and after (no microcycle)		Measurement method	Group of measur- ement
Before	After	Before	After	Before	After		
69,62	72,23	68,07	67,07	68,53	67,27	Hand clenching (kg)	Chosen EUROFIT tests
229,23	233,85	227,07	234,93	228,80	224,40	Long jump from standing (m)	
48,31	52,08	34,93	32,93	34,00	32,87	Bent arms overhang (s)	
25,69	27,85	24,60	26,33	25,73	25,47	Sit-ups from lying position in 30 sec.(s)	
17,92	17,54	20,13	19,13	19,00	19,60	Shuttle run 10x 5m	
2508,46	2583,85	2357,33	2445,33	2606,67	2571,3 3	Cooper's run w 12 min(m)	
86,54	85,46	88,67	87,20	90,43	90,87	Chest (cm)	CIRCUMF- ERENCES
29,15	28,69	31,33	30,87	31,87	32,13	Arm (cm)	
79,23	77,23	85,13	83,27	83,60	83,07	Abdomen (cm)	
52,15	51,00	55,20	55,53	56,20	56,27	Thigh (cm)	
1,12	1,00	1,28	1,16	1,19	1,22	Shoulder blade (cm)	FAT FOLDS
1,07	0,89	1,24	1,14	1,39	1,41	Chest (cm)	
1,34	1,20	1,63	1,49	1,33	1,35	Arm(cm)	
1,82	1,48	1,97	1,83	1,96	1,94	Abdomen (cm)	
2,05	1,97	2,28	2,23	1,85	1,76	Thigh (cm)	
19,64	19,25	21,91	21,40	21,75	21,91	Body mass (kg)/ body height (m <sup>2</sup> )	BMI

In this work in most cases noted was decrease of circumferences, which may be a result of fat level decrease. Analyzing results of own researches stated was statistically significant impact of eight week training realized in group I and II on decrease of adipose tissue measured under shoulder blade, chest, arm and abdomen. Moreover noted was improvement of results in tests of physical fitness: in static (local) force measured with dynamometer, dynamic force measured with long jump from standing and functional force in group II (measured with bent arms overhang), strength of muscles in the middle part of the body measured with sit-ups from lying position, and locomotive force in group II (measured with shuttle run 10x5 m). Observed was also a relation with aerobic capacity. Results of Cooper's test (12 minutes of constant run) were much better

in “post” than “pre” test. However one cannot unambiguously objectively refer to the results of the studies, since none of compared groups did not performed additionally aerobic training of long effort. During efforts longer than few seconds ATP is being resynthesized from both aerobic and anaerobic processes. Ability of resynthesis may restrict efficiency in many disciplines. Training athletes using high intensity efforts should increase aerobic and anaerobic capacity<sup>10</sup>. Empiric evidences on influence of interval training on an adipose tissue are presented by Tremblay and others<sup>11</sup>, who confirmed impact of interval training on decrease of subcutaneous adipose tissue. Analyzing physiology of effort one comes to conclusion that the better way of reducing fat body mass is above all prolonged training of low intensity. It is because one does not draw any attention to reactions intervening right after the training, i.e. post-exertional metabolism. In own studies proved was weight loss within evaluation of BMI factors. Both GE.I and GE.II group have reduced statistically significantly their body weight and BMI<sup>12</sup> rate locates tem in the group of desired values.

## Conclusions

In result of researches carried out the research team is justified to formulate following conclusions:

1. There is a statistically significant difference in level of somatic features and motor abilities after 8 week training in group GE.I. Changes are related to increase of level of static force (measured by clenching the dynamometer), dynamic force (measured by long jump from standing) strength of muscles in the middle part of the body (measured by sit-ups from lying position),

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<sup>10</sup> J. I. Medbø, I. Tabata, *Relative importance of aerobic and anaerobic energy release during short-lasting exhaustive bicycle exercise*, w: Journal of Applied Physiology 67, 1989, p. 1881-1886.

<sup>11</sup> A. Tremblay, J.A. Simoneau, C. Bouchard, *Impact of exercise intensity on body fatness and skeletal muscle metabolism*, w: Metabolism clinical and experimental, Volume 43, Issue 7, July 1994, p. 814-818, Elsevier, Quebec.

<sup>12</sup> S. Gołąb, M. Chrzanowska, *Przewodnik do ćwiczeń z Antropologii*, AWF Kraków 2007.

and functional force (measured by bent arm overhang). Observed was also an increase of cardiorespiratory endurance (measured by Cooper's test). Reduced were circumferences of muscles of chest, abdomen, thigh and skin and fat folds (shoulder blade, arm and abdomen).

2. There is a statistically significant difference in the level of somatic features and motor abilities after 8 week training in group GE.II. Increased was the level of dynamic force (measured by long jump from standing), functional force (measured by time of bent arms overhang), locomotive speed (measured by shuttle run 10x5 m), locomotive force in group II (measured by shuttle run 10x5 m), and cardiorespiratory endurance (measured by Cooper's test). Reduced were circumferences of muscles of chest, abdomen, thigh and skin and fat folds (shoulder blade, arm and abdomen) and BMI rate of examined.
3. There is a statistically significant difference in level of motor abilities after 8 week training program in groups performing the training GE.I and GE.II. The difference is an increase of functional force (measured by overhang) in favor of the group I. The difference relates also to locomotive speed (measured by shuttle run 10x5 m) in favor of the group II.
4. Experimental training, which does not engage directly free fatty acids during the training to producing energy or use relatively few of them, may have positive influence on burning an adipose tissue.
5. Stimulation with short trainings of anaerobic characteristic improves the short-term endurance, but also the long-term one, as it is proved by results of Cooper's test.
6. An additional element used in the scientific experiment was a clear accent of trainers on *motivating* the examined, associated to known from psychology need of rising own *self esteem*. In this case factors of realization of such need were: a) *self-esteem*; b) *reflected ego* c) – additionally –

*evaluation of the so called significant person* – i.e. the trainer. This element was treated as intellectualization of training process that has catalytic function for the quality of process in discussed case and an accent on reliable approach to force the intensity.

7. Envisaged is wider discussing of the presented scientific experiment of exerting an influence on people also in the context that is beyond this elaboration. It is about deepening of motivational activity of trainers dedicated to entrants of the training. It is done within methods for influencing people, described inter alia by Zimbardo. They are obviously situated in the area of security culture within skillfully constructed and conducted process of intellectualization. However it requires, in opinion of management of Institute of Security and Socio-Legal Studies further researches that are a continuation of realization of a wider project carried out in School of Higher Education in Public and Individual Security “APEIRON” in Cracow.
8. Training along with 15-20 minutes of warm-up and main part lasts ca. 50 (60) minutes (10-15 minutes of ending suppleness and relaxing exercises). Short time of work may be an alternative for long trainings with similar influences on functions of organism than in case of aerobic training.

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