



# Physical activity and general motor mode of the adult population in the system of ontogenesis

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## Abstract

**Objective of the study** was to identify the influence of physical activity during preparation for testing the GTO complex on the habitual motor mode of the adult population in various periods of age development.

**Methods and structure of the study.** The experiment involved 480 men and 480 women aged from 25 to 70 years. To assess exercise tolerance, the Borg Rating of Perceived Exertion Scale (Borg CR10 Scale) was used. Heart rate and the number of steps taken per day were recorded using individual fitness gadgets.

**Results and conclusions.** It was found that the most effective balance of load and recovery time is achieved with two classes per week. The implementation of the research results will help optimize preparation for performing tests of the GTO complex based on a balanced combination of household and physical activity, ensuring a high level of performance, improving physical qualities and motor skills, and the ability to fulfill the state requirements of the GTO complex for insignia while maintaining health.

**Keywords:** *adult population, physical activity, motor mode, heart rate, training effect, physical fitness, tests of the GTO complex.*

**Introduction.** Features of physiological life support systems determine individual, potentially probable modes of human motor activity in each age period. At the same time, any human motor activity is produced, ensured and regulated in the interaction of the neuromuscular, cardio-respiratory, endocrine and other systems of the body. At the same time, systematic physical activity optimizes the functional capabilities of the practitioner's body, influencing overall well-being, readiness to perform professional, household and physical activities in the process of life [2, 3, 9]. In this regard, one of the conditions for increasing performance is the balance of load and recovery, as two interrelated aspects of a single process of adaptation of the body to physical activity: with the correctly selected amount of impact of physical exercise (load) on the body of those in-

involved, an optimal combination of work and rest is ensured, it is noted positive effects of training; when the load exceeds the body's capabilities, redundancy of the adaptive reaction is observed and, as a consequence, tension in compensatory functions; at a low level of load from the proposed magnitude of impact, a weakening of adaptation processes occurs and a decrease in the training effect on the body [4, 5, 7, 8]. In this regard, when working with the adult population during the implementation of the GTO complex, taking into account the various functional capabilities of the body within wide age boundaries, the study of the body's recovery response under different volumes of training loads, as an indicator that determines the optimal frequency of training in a weekly cycle, for ensuring readiness to perform VFSK GTO tests while maintaining the usual physical activity.



**Objective of the study** was to identify the influence of physical activity during preparation for testing the GTO complex on the habitual motor mode of the adult population in various periods of age development.

**Methods and structure of the study.** The experiment involved 480 men and 480 women aged from 25 to 70 years with different levels of physical activity, who were admitted to prepare for testing the GTO complex. Participants in the experiment are characterized by normal heart rate values at rest ( $70 \pm 7,8$  beats/min – men and  $72 \pm 7,2$  beats/min – women) with increased values of body mass index ( $30,8 \pm 2,2$  kg/m<sup>2</sup> – men,  $25,9 \pm 2,3$  kg/m<sup>2</sup> – women). Preparation was carried out during complex independent training for 8 months according to individual programs with a frequency of 1 to 5 lessons per week, lasting at least 60 minutes.

The study examined the body's response to physical activity, including the subjects' subjective assessment of recovery time. To assess physical activity, the Borg Rating of Perceived Exertion Scale (Borg CR10 Scale) [10] was used. A comparison was made of the overall habitual daily motor pattern (in steps) within one month before the start of training and four weeks of preparation for performing tests of the GTO complex. Registration of heart rate during training sessions and the number of steps per day was carried out using individual fitness gadgets. The results of monitoring physical activity (the number of locomotions per day, heart rate indicators during exercise) were sent for processing to the laboratory of the PFC and MS of the Federal Scientific Center VNIIFK. after each lesson; the recovery time after the load was recorded and reported after the disappearance of subjective symptoms of fatigue and the appearance of the desire to

*Table 1. Subjective assessment of the severity of physical activity in a weekly physical activity regime according to the Borg scale (n=960)*

Age	Average score on the Borg Self-Esteem Scale (point)	Average recovery time after exercise (hour)	Average value of weekly physical activity before the experiment (number of steps)	Average value of weekly physical activity after 4 weeks of exercise (number of steps)	The difference between the number of steps before the experiment and after 4 weeks of the experiment (in%)
<b>1 training session per week</b>					
25-29	3,4±0,8	12,1±4,2	76599,3±10286,4	74228,6±9489,2	3,1
30-39	3,8±0,9	15,0±8,4	77413,4±10562,4	74488,2±9497,4	3,8
40-49	3,5±0,5	21,0±2,8	80815,9±11145,7	74772,1±11188,6	7,5
50-59	3,3±0,5	22,0±2,2	66908,4±5780,3	60385,6±5499,5	9,7
60-69	4,0±0,7	31,8±6,4	60395,2±10186,8	51634,9±8722,0	14,5
70+	4,2±0,7	40,4±6,4	51155,6±8459,0	43769,4±7885,0	14,4
<b>2 training sessions per week</b>					
25-29	4,0±0,6	25,9±4,2	86273,6±8879,2	77479,2±8975,4	10,2
30-39	4,1±0,5	26,5±4,4	89128,0±5880,8	79569,8±6266,1	10,7
40-49	4,3±0,5	28,2±5,0	84473,6±8267,0	74279,2±9514,8	12,1
50-59	4,5±0,6	31,5±6,2	78474,4±5697,7	67878,7±6181,9	13,5
60-69	4,7±0,7	43,2±8,8	67087,7±7548,5	56712,1±7077,3	15,5
70+	4,9±0,7	45,4±9,4	59274,4±6036,2	49278,7±6411,4	16,9
<b>3 training sessions per week</b>					
25-29	4,7±0,5	57,2±6,4	100207,9±11636,7	81780,7±11327,3	18,4
30-39	4,9±0,6	59,8±7,7	97505,9±6225,8	79121,7±9240,4	18,8
40-49	5,0±0,6	60,7±6,9	94087,9±3481,8	72009,5±5603,6	23,5
50-59	5,2±0,5	62,9±6,1	92567,9±2481,1	70669,5±5024,9	23,7
60-69	5,4±0,5	69,4±11,6	83995,5±4528,2	63906,2±9037,4	23,9
70+	5,6±0,5	73,9±11,8	77967,5±5609,4	57469,5±5901,5	26,3
<b>4-6 training sessions per week</b>					
25-29	5,7±0,5	78,1±8,9	104426,0±9386,8	84981,2±9156,8	18,6
30-39	5,8±0,5	79,1±8,8	99528,0±5806,3	80022,1±7119,2	19,6
40-49	5,9±0,5	79,7±10,2	98051,6±6073,3	74047,0±3111,9	24,5
50-59	6,1±0,3	85,2±3,6	89851,6±5662,5	64247,0±2573,0	28,5
60-69	6,2±0,4	86,9±5,2	80344,4±6206,9	54307,8±2563,2	32,4
70+	6,4±0,5	88,3±5,8	70051,6±6663,5	40347,0±5339,8	42,4



Table 2. Index of adaptation potential of the cardiovascular system in men and women by age groups in the process of preparation for testing the GTO complex (according to R.M. Baevskiy) (n= 960)

Gender	Parameter	25-29 years old	30-39 years old	40-49 years old	50-59 years old	60-69 years old	70-79 years old
Men	X	2,5	2,6	2,9	3,0	3,3	3,4
	$\sigma$	0,2	0,2	0,2	0,2	0,2	0,2
Women	X	2,3	2,5	2,6	2,9	3,1	3,3
	$\sigma$	0,2	0,2	0,2	0,3	0,3	0,2

train. To assess the balance of training effects during the preparation process, the adaptation potential (AP) of the cardiovascular system (CVS) was determined according to the method of R.M. Baevskiy [1]. The obtained data was processed by the method of mathematical statistics using mathematical and statistical programs Stadia 6.0 (Russian Federation).

**Results of the study and discussion.** In the modern GTO complex, the level of physical fitness of participants is assessed based on the results of testing the basic physical qualities and motor capabilities provided for by the state requirements of the complex. Accordingly, in the preparation process, subjects use a wide range of physical training means, which are predominantly complex in nature. The decisive role in influencing changes in the functional state of the body is played by the balance of the volume of physical activity and the speed of recovery of the body [6].

The data obtained during the study indicate that the perceived severity of physical activity in preparation for performing tests of the GTO complex in men and women varies from moderate at the age of 25-29 years to very severe at 70 years and older (Table 1).

Analysis of the data obtained indicates that an increase in the frequency of exercise in a weekly cycle leads to significant shifts in the assessment of the subjective perception of physical activity and the duration of recovery time, being an indicator of the risk of maladjustment. The most optimal combination of load and recovery time was found with two classes per week - recovery time ranges from 25 to 45 hours. With four or more training sessions per week, there is a significant increase in recovery time in all age groups (over 3 days).

Monitoring of indicators of dynamic control over the state of the AP of the cardiovascular system engaged in preparation for testing of the GTO complex demonstrates various gender and age variations: at 25-29 years old - a satisfactory state of adaptation mechanisms; at 30-59 years old for men and at 40-59

years old for women – tension in adaptation mechanisms; at 60 years of age and older – a decrease in the functional capabilities of the body with unsatisfactory adaptation to training influences (Table 2).

A comparative analysis revealed a tendency for a negative relationship between the volume of motor activity and the frequency of training sessions (per week): performing one training session per week reduces the volume of habitual motor activity by 8,8% on average for all age groups; with two training sessions per week – by 13,1%; with three training sessions per week – by 22,4%; with 4-5 sessions – by 27,7% (Table 1). In addition, the negative effect of the frequency of training loads on the usual volume of physical activity increases in accordance with age-related and involuntary changes. For example, in the case of one training session per week, a decrease in the volume of physical activity is observed from 3,1 (25-29 years) to 14,4% (70 years), while with four or more training sessions - from 18,6 (25-29 years) to 42,4% (70 years), indirectly demonstrating the likely limits of the functional capabilities of providing motor activity with load factors of varying magnitude and content in different periods of ontogenesis.

**Conclusions.** The study revealed the effect of exposure to varying amounts of physical activity on the habitual motor pattern during the day. The new knowledge obtained indicates that two sessions per week with a duration of 50 minutes each correspond to the basic training effect (allowing you to prepare for performing tests of the GTO complex at the bronze badge level), have a slight effect on reducing habitual physical activity during the day, ensuring readiness for the next lesson within 48 hours.

The motor mode with 3 or more training sessions per week with a duration of 50 minutes each is more suitable for individuals who have a fairly high level of functional fitness, ensured by an adequate response of adaptive systems to loads of varying magnitude and specificity. Accordingly, when planning preparations



for performing tests of the GTO complex, it is necessary to combine household and physical activity in such a way as to ensure the optimal time (48 hours) for restoring the functional capabilities of the body, which will help maintain a high level of performance during the day, improve physical qualities and motor skills and skills as the basis for fulfilling the state requirements of the GTO complex for insignia.

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