The Impact of the Digital Economy on Population Health

UDC 796

PhD **E.A. Zyurin**[1]
Dr. Biol. **T.F. Abramova**[1]
D.A. Maltsev[1]
E.N. Petruk[1]
[1]Federal Scientific Center for Physical Culture and Sports (VNIIFK), Moscow

Corresponding author: rudra54@yandex.ru

Received by the editorial office on 26.05.2025

Abstract
Objective of the study is to assess the level of physical fitness of the population in the digital economy.
Methods and structure of the study. The scientific work involved 140 men and 140 women aged 25 to 59 years. The study participants belong to two areas of work with different levels of physical activity. All are admitted to physical education and sports and live in the Vladimir, Moscow, Smolensk regions and the city of Moscow.
Results and conclusions. The study did not reveal any significant differences between the morphofunctional indicators, physical activity and the level of physical fitness in people who mainly use IT technologies in the process of work and everyday activities, and people who do not identify themselves with digital processes. Therefore, when developing programs to improve the physical fitness of the population, in the digital economy, it is necessary to take into account the trends towards an increase in general physical activity in the context of automation of all aspects of life, including indicators of physical fitness that ensure a person performs basic social functions without risk to health.

Keywords: *working-age population, physical activity, motor activity, digital economy, physical fitness, electronic games, modernization of society.*

Introduction. The current geoeconomic reality raises the issue of sustainable development of the state based on large-scale technological modernization in order to ensure dynamic growth of labor productivity, which requires the most efficient use of human capital [6, 8]. Human health, as the main actor in the economy, acting as a producer of goods and services, a consumer of created goods and a manager of social production, is considered the main economic resource. Individual diversity of values, priorities, beliefs and stereotypes, along with education, qualifications and experience, determines the boundaries and possibilities of technological, economic and social modernization of society [2, 7].

Digitalization of the economy transforms the type of labor from physical to mental (operator profile of labor activity), minimizing muscle effort, increasing the load on human sensory systems [3]. Physical education, as a motor activity, the implementation of which is ensured by interaction and promotes the activation of the neuromuscular, cardiorespiratory, endocrine and other body systems, is the most effective and universal mechanism for preventing the negative consequences of decreased physical activity. Accordingly, identifying the characteristics of physical development and motor activity of the population involved in the digital economy, taking into account the nature of work, serves as the basis for developing scientifically sound proposals to improve the physical fitness of the working-age population, which is the relevance of our study.

Objective of the study is to assess the level of physical fitness of the population in the digital economy.

Methods and structure of the study. 140 men and 140 women aged 25 to 59 years took part in the scientific work. The study participants belong to two areas of work with different levels of physical activity. All are admitted to physical education and sports and live in the Vladimir, Moscow, Smolensk regions and the city of Moscow. The group was divided into two subgroups: the first – confident users of digital services, mainly use digital technologies in the work process (operators of automated systems and forms of employment associated with the use of personal electronic devices) (hereinafter – group 1); the second – uncertain users of Internet technologies, mainly use components of the production economy in their work (hereinafter – group 2). The participants in the experiment were characterized by normal resting heart rate values (74±6.9 bpm for men and 75±7.1 bpm for women) with elevated body mass index values (29.5±2.1 kg/m2 for men and 27.7±2.9 kg/m2 for women).

The study included a comparative analysis of morphofunctional parameters (body length and weight, BMI, heart rate, vital capacity). The motor regime (number of steps) and the body's response to physical activity based on heart rate were studied. The time spent using electronic devices in work and leisure activities was recorded. To assess physical fitness, the physical fitness level index (hereinafter referred to as PLI) and the physical quality development level index (hereinafter referred to as PHQLI) were calculated using the modernized VNIIFK scale [4, 5]. Registration of physical activity indicators (number of steps per day, heart rate indicators during physical training) was carried out using individual fitness gadgets. The adaptation potential (AP) of the cardiovascular system was calculated using the method of R.M. Baevsky [1]. The obtained data were processed in the mathematical and statistical program Stadia 6.0. (RF).

Results and conclusions. A comparative analysis of representatives of the 1st and 2nd groups of the population demonstrated that the indicators of physical development do not have statistically significant differences ($p > 0.05$) depending on the predominant use of digital technologies in the work process (Table 1). The BMI of men in the studied groups indicates overweight with a statistically insignificant predominance in men of the first group with complete identity in the female groups. Heart rate at rest and vital capacity correspond to normal values, not statistically different in the groups of men and women.

The response of the cardiovascular system (HR) to physical activity in most groups is in the zone of 130 bpm, indicating low-intensity physical activity, highlighting a statistically insignificant higher HR value in women of the 2nd group. Accordingly, physical development is not criterion-significant for differentiating the population based on the use of digital technologies, which is also true for a similarly low level of fitness in both sexes.

Analysis of physical activity indicators also indicates the absence of clearly expressed intergroup differences ($p > 0.05$) (Table 2).

The average daily number of steps per day for men approaches 10,000 steps, for women – 9,000 steps. The time spent on physical exercise per week is statistically insignificantly higher for representatives of the 1st group than for those in the 2nd group. The revealed amount of time spent on exercise does not allow us to classify either men or women in these samples as systematically engaged in physical activity. Men in the 1st group use electronic devices 50 minutes more per week than men in the 2nd group, and women in the 1st group – 1 hour 10 minutes more than women in the 2nd group. Presumably, the time spent on electronic devices can be considered as a factor limiting physical activity.

Physical fitness corresponds to the average (base) level for the population of the corresponding age, without revealing reliable differences in the groups under consideration ($p > 0.05$), with a tendency towards a higher level of fitness in representatives of both sexes of the 1st group (Table 3).

The least developed physical quality is endurance in both groups, strength and flexibility are developed more evenly, with a pronounced, but statistically insignificant advantage in the 1st group. Thus, physical

Table 1. Morphofunctional indicators in groups of the working-age population with different levels of use of digital technologies in professional and everyday activities (n=280)

Contingent	Gender	BMI according to Quetelet, (kg/m²)	Resting heart rate (bpm)	HR max after exercise (bpm)	Vital capacity of the lungs (ml)
		X±σ	X±σ	X±σ	X±σ
Group 1	Men	28,9±3,6	73,6±6,7	128,6±12,3	3957,2±335,7
	Women	27,6±2,0	72,8±7,4	133,5±9,7	3243,2±118,7
Group 2	Men	26,1±2,2	74,0±7,0	128,6±12,3	3905±413,4
	Women	27,7±3,7	76,5±6,7	143,9±16,8	3257,5±312,9

Table 2. Physical activity indicators in groups of the working-age population with different levels of use of digital technologies in professional and everyday activities (n=280)

Contingent	Gender	Physical activity (number of steps per day)	Time of contact with electronic devices outside of work (min per week)	Time for physical education and sports classes (min per week)
		X±σ	X±σ	X±σ
Group 1	Men	9726,9±3082,6	300±60,0	90±36,0
	Women	8899,0±3298,5	340±72,0	70±18,0
Group 2	Men	9601,0±3465,4	250±84,0	80±18,0
	Women	9318,6±2859,5	270±78	60±19,0

Table 3. Physical fitness indicators in groups of the working-age population with different levels of use of digital technologies in professional and everyday activities (n=280)

Contingent	Gender	Endurance (URFK index in points)	Strength (URFK index in points)	Flexibility (URFK index in points)	Index UFP (points)
Group 1	Men	2,9±0,8	3,6±0,3	4,1±0,8	3,5±0,5
	Women	3,0±0,6	3,9±0,6	3,8±0,8	3,6±0,4
Group 2	Men	3,2±0,9	3,1±0,8	3,4±0,8	3,2±0,6
	Women	3,0±0,9	3,0±0,7	3,2±0,9	3,1±0,7

fitness corresponds to the average level regardless of the use of digital technologies in the daily routine, with a tendency towards a higher level of development of strength and flexibility in men and women of the 1st group.

The level of adaptive potential (hereinafter referred to as AP) of the circulatory system to physical activity (according to R.M. Baevsky) indicates that the motor regime in groups of men and women can be characterized by functional stress with increased activation of adaptation mechanisms, which corresponds to the second health group (Table 4).

Thus, the indicators of morphofunctional status, motor activity and physical fitness do not have statistically significant differences between groups with different levels of use of digital technologies in professional and everyday activities. At the same time, there is some disproportion in the differences in the time of using electronic devices (higher in men and women of group 1 by 17-21%) and the time of physical exercise (higher in men and women of group 1 by 11-13%). The data obtained indicate the need to increase control over the unlimited use of digital technologies in everyday life and the formation of motivation to use the freed up time for doing "sports".

Conclusions. Thus, the study did not reveal significant differences between the morphofunctional indicators, motor activity and the level of physical fitness in individuals who mainly use IT technologies in the process of work and everyday activities, and individuals who do not identify themselves with digital processes in the economy, with a low level and do not play. Accordingly, when developing programs to improve the physical fitness of the population, in the context of the digital economy, it is necessary to focus on measures to increase overall physical activity in the context of automation of all aspects of life, including indicators of physical fitness that ensure a person performs basic social functions without risk to health.

The work was carried out within the framework of the state assignment of the Federal State Budgetary Institution Federal Scientific Center of Physical Culture No. 777-00001-25 (topic code No. 001-24/3).

Table 4. Adaptive potential of the cardiovascular system in groups of the working-age population with different levels of use of digital technologies in professional and everyday activities (n=280)

Contingent	Gender	Adaptation potential (AP) in conventional units (c.u.) according to R. M. Baevsky
Group 1	Men	2,9±0,2
	Women	3,0±0,2
Group 2	Men	2,9±0,3
	Women	3,1±0,3

References

1. Baevsky R.M., Berseneva A.P. Ocenka adaptacionnyh vozmozhnostey organizma i risk razvitiya zabolevaniy. M.: Medicina, 1997. 235 p.
2. Gorozhanova O.N. Cifrovizaciya i ee vliyanie na zhizn sovremennogo obshchestva. Aktualnye voprosy razvitiya sovremennogo obshhestva, ekonomiki i professionalnogo obrazovaniya: mat. XVIII mezhd. konf. Ekaterinburg: RGPPU, 2021. Pp. 27- 29.
3. Zyurin E.A., Abramova T.F., Matveev A.P., Petruk E.N. Fizicheskaya nagruzka i obshhiy dvigatelnyy rezhim vzroslogo naseleniya v sisteme ontogeneza. Teoriya i praktika fizicheskoy kultury. 2024. No. 7. Pp. 78-80.
4. Kurentsov V.A., Zyurin E.A., Perova E.I. Issledovanie individualnyh harakteristik fizicheskoy podgotovlennosti studentov-pervokursnikov kak komponenta uspeshnosti osvoeniya professii i formirovaniya ZOZh. Fizicheskoe vospitanie i detsko-yunosheskiy sport. 2015. No. 2. Pp. 56- 61.
5. Lenchuk E.B. Osnovnye kontury nauchno-tekhnologicheskoy politiki Rossii v usloviyah vneshnih ogranicheniy. Ekonomicheskoe vozrozhdenie Rossii. 2023. No. 3(77). Pp. 16-24.
6. Letyagina E.N., Perova V.I., Kutasin A.N. Innovacionnyy podhod k issledovaniyu razvitiya chelovecheskogo kapitala sredstvami fizicheskoy kultury i sporta s ispolzovaniem nauchnogo instrumentariya neyronnyh setey. Kreativnaya ehkonomika. 2020. Vol. 14. No. 8. Pp. 1863- 1874.
7. Shomakhov K.R. Chelovecheskiy potencial kak faktor ekonomicheskogo rosta i ekonomicheskoy bezopasnosti Rossii. Ekonomicheskaya bezopasnost. 2023. Vol. 6. No. 4. Pp. 1381– 1402.