UDC 614.2
DOI: 10.21668/health.risk/2022.2.09.eng

Read online

Research article

ASSESMENT OF SCIENTISTS' LIFESTYLE AND RISK FACTORS AFFECTING THEIR PROFESSIONAL EFFICIENCY

M.D. Vasiliev[1], E.V. Makarova[1], A.A. Kostrov[1], S.A. Palevskaya[1,2], S.M. Smbatyan[1,3]

[1]N.A. Semashko National Research Institute of Public Health, bldg. 1, 12 Vorontsovo Pole Str., Moscow, 105064, Russian Federation
[2]Samara State Medical University, 18 Gagarina Str., Samara, 443079, Russian Federation
[3]M.F. Vladimirsky Moscow Regional Research and Clinical Institute (MONIKI), bldg. 1, 61/2 Shchepkina Str., Moscow, 129110, Russian Federation

People involved in scientific research should keep their cognitive status high since this is necessary for preserving their intellectual potential and maintaining their work efficiency. Given that, it seems important to determine what impacts scientific work might have on mental health, to estimate potential disorders and to develop a strategy aimed at preventing cognitive impairments. Our research goals were to perform screening assessment of executive functions, to examine signs of premature ageing and to explore behavioral and social risk factors among Russian researchers.

We accomplished a cross-sectional study with 213 researchers employed by state scientific institutions in Moscow participating in it; they were 116 women and 97 men aged from 23 to 78 years (their average age was 45.48 ± 15.33 years).

As a result, we established that risk factors causing a decline in professional efficiency were rather frequent among the participants. Probable cognitive disorders were detected in 9.85 % of them and we should note that these disorders were not age-related. We detected signs of senile asthenia in 3.28 % of the participants and senile depression in 2.34 %. Two thirds of the participants had subclinical depression (74.6 %). Only one fifth of the respondents (19.71 %, n = 42) did not have any cognitive impairments, asthenic syndrome, or depression. A quarter of the researchers (25.34 %) were not sufficiently committed to healthy lifestyle. Low physical activity established for 79.3 % of the respondents was the major risk factor; among others, we can mention irrational nutrition, primarily among those researchers who worked with students; poor stress management skills among physicians who combined clinical practice with science; difficulties in interpersonal relationships among people who dealt solely with research.

It is necessary to implement corporate programs aimed at prevention and rehabilitations for researchers in order to preserve their scientific activity and professional efficiency as well as to extend their professional longevity

Keywords: *professional longevity, researchers, doctors, teachers, intellectual work, quality of life, cognitive functions, lifestyle.*

Scientists play a significant role in the development of the contemporary world as they create new concepts, form opinions, analyze great volumes of variable data, research and suggest new scientific methods [1]. Research work, just as any other intellectual one, differs from physical labor since it exerts greater loads on the nervous system. These loads can result in negative health outcomes [2, 3]. Research work also involves the necessity to perform multiple functions, to process great volumes of information and to face substantial psychoemotional stress [3]. It is especially true when it comes down to researchers who combine either science and clinical practice or science and teaching. Nowadays, this combina-

Mikhail D. Vasiliev – Candidate of Medical Sciences, Senior Researcher (e-mail: m.vasilev@mail.ru; tel.: +7 (910) 686-51-81; ORCID: https://orcid.org/0000-0003-1646-7345).

Ekaterina V. Makarova – Candidate of Medical Sciences, Senior Researcher (e-mail: rue-royal@inbox.ru; tel.: +7 (915) 111-41-37; ORCID: https://orcid.org/0000-0003-3767-8475).

Alexey A. Kostrov – research laboratory assistant (e-mail: Alexey.kostrov@profite.ru; tel.: +7 (962) 155-50-00; ORCID: https://orcid.org/0000-0001-7566-212X).

Svetlana A. Palevskaya – Doctor of Medical Sciences, Professor, Leading Researcher (e-mail: svetpal1972@gmail.com; tel.: +7 (903) 264-18-84; ORCID: https://orcid.org/0000-0001-9263-9407).

Siran M. Smbatyan – Doctor of Medical Sciences, Professor, Leading Researcher (e-mail: smbsiran@mail.ru; tel.: +7 (916) 280-95-91; ORCID: https://orcid.org/0000-0002-1961-9458).

tion of two different professional roles is quite typical [4]. Such overloads can lead to burnout and various health disorders [5, 6]. On the other hand, many authors believe intellectual work to be a factor that protects from cognitive ageing [7–9].

Researchers should keep their cognitive status high since this is necessary for preserving their intellectual potential and maintaining their work efficiency. Given that, it seems important to determine what influence research work has on mental health; to estimate potential disorders; and to develop a strategy aimed at preventing cognitive impairments [7].

Cognitive functions decline with age; the process is known as cognitive ageing. It is becoming a most outstanding challenge for public healthcare in the 21st century [10–12]. Previous studies describe a significant age-related decrease in such cognitive functions as executive functions, short-term memory, sequence thinking, information processing speed and naming speed, visual and verbal memory [13].

Literature analysis has revealed two major trends in relevant studies [14–16]. They either concentrate on estimating negative factors that cause cognitive ageing and poor executive functions (hypertension, apolipoprotein E, type 2 diabetes mellitus, cardiovascular and cerebrovascular diseases), on one hand [17–18]; or they aim to detect protective factors (education, intellectual activity, physical activity, giving up smoking, a proper diet), on the other hand [19–20].

There are no data available in literature that can describe researchers in Russia as a specific population group or provide some insight into risk factors that can reduce their professional efficiency. However, such studies are necessary for developing prevention and rehabilitation programs aimed at preserving intellectual potential and extending professional longevity.

Our research goals were to perform screening assessment of executive functions; to examine signs of premature ageing; and to explore behavioral and social risk factors among Russian researchers.

Materials and methods. We accomplished a cross-sectional study with 213 researchers employed by state scientific institutions in Moscow participating in it; they were 116 women and 97 men aged from 23 to 78 years (their average age was 45.48 ± 15.33 years).

Having assessed general health of the participants, we established that 28.31 % of them had chronic diseases; 43.3 % were practically healthy; and only 28.3 % had perfect health. Hypertension prevailed among chronic diseases accounting for 50.0 % (the 1st place). It was followed by diabetes mellitus and metabolic disorders (15.0 %, the 2nd place) and oncological diseases (10.0 %, the 3rd place).

The researchers who participated in the screening were distributed in different age groups as follows:

- 8.9 % were aged 20–30 years (n = 19);
- 20.57 %, 30–40 years (n = 44);
- 17.9 %, 40–50 years (n = 38);
- 16.9 %, 50–59 years (n = 36);
- 16.4 %, 60–69 years (n = 35);
- 19.33 % were older than 70 years (n = 41).

A period dedicated to scientific and research work varied from 1 year to 50 years (the median was 24.8 years). The greatest shares of the participants had working experience of 20–30 years (28.86 %) and 5–10 years (21.03 %). They were followed by the researchers with their working experience being equal to 30–40 years (19.09 %) and 40–50 years (18.5 %). A share of the researcher with short working experience (from 1 to 5 years) was rather small (12.52 %).

We created a screening test-card to obtain data on the quality of life and cognitive status of the participants. The test-card included several validated questionnaires in Russian that were printed on paper and handed out to the participants.

The participants were offered to fill in the following questionnaires:

1) Cognitive Difficulties Scale by McNair and Kahn (to assess cognitive loads and cognitive activity);

2) "Age is not an obstacle" (an intellectual anamnesis in young and middle age, intellectual activity);

3) Geriatric Depression Scale (GDS);

4) Health Promoting Lifestyle Profile (HPLP), an international questionnaire validated for use in Russia;

5) SF-36, a non-specific survey that measures quality of life, a version validated for use in Russia. Standard indicators for different age groups and the population in general were taken from "SF-36 Health Survey: Manual and Interpretation Guide" by J.E. Ware (1993)[1]. The Guide contains average indicators describing quality of life for people from different age groups who do not have any chronic diseases but have certain risk factors in their life (the 1st and 2nd health groups as per the WHO classification).

Results. The participants left school at the age from 15 to 18 years (the average age was 17.13 ± 1.04 years). The share of the participants who completed post-graduate studies or were taking them at that moment amounted to 76.05 % (n = 162). Seventy-three point seven percent (n = 157) defended their thesis for Candidate of Sciences degree at the average age being 35.53 ± 3.44 years (from 29 to 46 years).

Theses for Doctor of Sciences degree were defended by 44.6 % of the participants (n = 95) at the average age of 48.5 ± 6.85 years (from 38 to 57 years).

Almost 70 % of the participants (69.95 %, n = 149) were given a title "Associate Professor" at the average age of 38.38 ± 4.11 years (from 33 to 49 years); 41.78 % of the researchers (n = 89) were granted a Professor title at the average age 58.31 ± 10.42 years (from 45 to 66 years). Our sampling did not include any Academicians or Corresponding members of the Russian Academy of Sciences.

Forty-seven point four percent of the participants (n = 101) combined research work with teaching. On average, teaching experience amounted to 17.15 ± 7.20 years (from 1 year to 25 years).

The share of the participants who combined their researcher work with clinical practice, either in the past or when the study was conducted, amounted to 35.21 % (n = 75). On average, medical experience amounted to 16.06 ± 5.93 years (from 4 years to 31 years). Thirty-seven people among the participants were involved only in research activities (17.3 %).

Social aspects regarding living conditions were as follows. Most researchers (79.81 %, n = 170) owned their housing and the remaining 20.18 % rented it (n = 43). People who got married accounted for 79.34 % (n = 169) of the participants and the average age of getting married amounted to 26.77 ± 4.79 years (from 20 to 38 years). Only 53.84 % of all those people who got married (n = 91) were not divorced when this study was conducted. Seventy-nine point eight one percent of the researchers (n = 170) had children, from one to three (1.8 ± 0.7 on average).

Cognitive functions and signs of premature ageing. According to the results of "**Cognitive Disorders Scale"** as per McNair and Kahn, 89.67 % (n = 191) of the participants did not have any functional cognitive disorders. Probable cognitive disorders were detected in 10.3 % of the researchers (n = 22) (the total score exceeded 42). Average test results amounted to 27.23 ± 11.26 scores (from 9 to 49 scores) (Table 1).

We applied the **"Age is not an obstacle"** test to detect any signs of premature ageing. As a result, we did not establish any signs of senile asthenia in 74.17 % of the respondents (n = 158). Still, certain deviations were revealed in 25.8 % of the participants. Pre-asthenia was established in 22.5 % (n = 48); the results obtained for 3.28 % (n = 7) of the respondents indicated they had certain signs of senile asthenia. The average score estimate in the **"Age is not an obstacle"** test amounted to 2.06 ± 0.71 scores (from 0 to 5 scores) (Table 1).

According to the results of **"Geriatric Depression Scale"**, only 22.5 % of the researchers did not have any signs of depression (n = 48). We detected subclinical depression in 74.6 % of the participants (n = 159) and the results obtained for 2.34 % (n = 5) of them

[1] Ware J.E. SF-36 Health Survey: Manual and Interpretation Guide. USA, Health Institute, New England Medical Center Publ., 1993.

Table 1

The results produced by the screening tests in the overall group and subgroups determined as per activity types

Scales	Total (n = 213)	Researchers (n = 37)	Researchers-physicians (n = 75)	Lecturers (n = 101)
Cognitive screening (score)	27.23 ± 11.26	29.14 ± 12.77	33.62 ± 15.31*	22.21 ± 10.05
"Age is not an obstacle" (score)	2.06 ± 0.71	1.90 ± 0.55	2.86 ± 1.23*	1.65 ± 0.72
Geriatric depression scale (score)	7.38 ± 3.19	6.73 ± 3.12	7.95 ± 2.97	7.41 ± 3.33

N o t e : * means an authentic difference ($p < 0.05$) between physicians and lecturers.

Table 2

Life quality indicators as per SF-36 scores in the overall group and subgroups determined as per activity types

Domain	Total (n = 213)	Researchers (n = 37)	Researchers-physicians (n = 75)	Lecturers (n = 101)
PF	65.03 ± 15.50	91.07 ± 39.2	**44.66 ± 17.06***	62.60 ± 20.21
RP	52.65 ± 21.0	54.16 ± 26.71	50.55 ± 20.52	53.08 ± 20.0
BP	86.55 ± 17.40	96.04 ± 32.15	83.01 ± 33.78	83.23 ± 38.96
GH	51.76 ± 22.4	49.4 ± 19.39	45.13 ± 17.45	57.09 ± 23.11
VT	59.77 ± 19.1	56.34 ± 21.44	63.72 ± 20.6	59.38 ± 28.4
SF	84.06 ± 22.2	82.44 ± 37.03	86.38 ± 31.70	83.56 ± 39 ± 67
RE	61.21 ± 19.9	65.08 ± 28.42	**52.27 ± 19.34***	64.38 ± 27.06
MH	63.62 ± 22.0	64.97 ± 25.81	68.09 ± 26.3	60.16 ± 23.32
Physical wellbeing	44.39 ± 18.55	48.39 ± 20.75	**39.75 ± 12.04***	44.95 ± 10.44
Mental wellbeing	46.59 ± 20.09	43.60 ± 19.43	49.27 ± 18.66	46.65 ± 12.99

N o t e : * means an authentic difference ($p < 0.05$) between physicians and lecturers.

indicated actual depression. An average score as per GDS amounted to 7.38 ± 3.19 (from 4 to 11 scores) (Table 1). We also compared indicators between the subgroups with different activity types within the total sampling. Researchers who combined scientific work with clinical practice turned out to have more apparent cognitive disorders and asthenia signs in comparison with researchers who also worked with students (p = 0.01 and p = 0.02 accordingly). This might be due to greater stress and workloads.

Researchers' quality of life. We analyzed **quality of life** with the SF-36 survey version that was validated for use in Russia. According to the results, average indicators were established as per most scales among Russian researchers (Table 2). The following average scores were obtained for the analyzed sampling: PF = 65.03 ± 15.50 %, RP = 52.65 ± 21.0 %, BP = 86.55 ± 17.40 %, GH = 51.76 ± 22.4 %, VT = 59.77 ± 19.1 %, SF = 84.06 ± 22.2 %, RE = 61.21 ± 19.9 %, MH = 63.62 ± 22.0 %. General physical wellbeing amounted to 44.39 ± 21.27 %; general mental wellbeing, 46.59 ± 22.90 %.

We detected authentic differences in physical wellbeing between the subgroups with different activity types. It was significantly poorer among researchers-physicians than among people who were involved only in research ($p < 0.0001$), in particular, as per the "physical functioning" scale ($p < 0.0001$) and the "emotional role functioning scale" (p = 0.03) (Table 2).

Quality of life tended to decline with age among the analyzed researchers, just as it is the case with population in general. People aged 50–59 years had lower score estimates as per several scales against those aged 20–29 years. In particular, the indicators were lower as per the physical functioning (81.8 ± 22.8 % against 95.2 ± 10.2 %, p = 0.04), bodily pains (79.3 ± 30.9 % against 94.8 ± 9.9 %, p = 0.03)

and physical role functioning (75.0 ± 43.3 % against 93.4 ± 14.0 %, $p = 0.006$). Still, vitality and social functioning tended to improve with age since the lowest scores were detected among people aged 20–29 years (65.5 ± 22.8 % and 78.2 ± 22.3 % accordingly), then they grew among the participants aged 30–39 years (75.5 ± 11.0 % and 91.6 ± 10.8 % accordingly) and then, in general, remained stable without significant falls with age.

The best mental health was detected among people aged 30–39 years and older than 50–59 years. People who were older than 60 years tended to have lower scores as per the physical functioning scale than those aged 20–29 years (82.2 ± 17.5 %, $p = 0.02$) but higher scores as per emotional role functioning (81.4 ± 37.6 % against 63.1 ± 44.3 %). Overall, life quality of the researchers who were older than 60 years turned out to be higher than life quality of those aged from 50 to 59 years.

We analyzed sex-related peculiarities of life quality and revealed a difference in physical functioning. Men had higher scores as per this scale (94.8 ± 10.3 %) against women (85.0 ± 18.3 %, $p = 0.006$). On average, according to J.E. Ware[1], men tended to enjoy higher quality of life than women did, in particular, as per such indicators as vitality and physical role functioning.

Still, this trend was rather ambiguous among the researchers. For example, according to our data, women had higher scores as per the social functioning and the emotional role functioning scales ($p > 0.05$). Having compared life quality indicators obtained for the analyzed researchers with those obtained for population in general, we established that the researchers had authentically higher scores as per "bodily pains" (89.9 ± 17.4 % against 75.1 ± 23.69 %, $p = 0.008$) and "vitality (68.8 ± 19.1 % against 60.8 ± 20.9 %, $p = 0.04$). However, they had lower scores as per "emotional role functioning" (60.2 ± 1.9 % against 81.26 ± 33.04 %, $p = 0.001$) (Table 2).

More profound analysis of domains that described quality of life involved considering age-related differences between different age groups. As a result, certain peculiarities were detected in comparison with population in general. Thus, the researchers aged 30–39 had better scores as per "bodily pains"; the researchers aged 50–59 years had lower scores as per physical role functioning. We detected authentically lower scores as per emotional role functioning in age groups from 20 to 59 years. It is interesting to note, that this indicator grew among the researchers older than 60 years and reached the level typical for population in general.

As a whole, the participants who were older than 60 years had better quality of life than population in general; in particular, their indicators were higher as per the following scales: physical functioning, physical role functioning, bodily pains and vitality.

Correlations between cognitive functions and quality of life. The total score as per Cognitive Disorders Scale had positive correlations with the following SF-36 scales: "General health" ($r = 0.48$, $p = 0.0032$), "Vitality" ($r = 0.43$, $p = 0.002$), "Social functioning" ($r = 0.61$, $p = 0.0001$), "Mental health" ($r = 0.59$, $p = 0.0003$). We did not detect any correlations with age ($p > 0.05$).

The total score of the "Age is not an obstacle" test had positive correlations with such SF-36 scales as "Physical functioning" ($r = 0.45$, $p = 0.004$) and "Vitality" ($r = 0.38$, $p = 0.013$).

The total score as per GDS had positive correlations with "Mental health" ($r = 0.66$, $p = 0.0002$) and "Vitality" ($r = 0.57$, $p = 0.0037$) domains in the SF-36 survey.

Only one fifth of the respondents (19.71 %, $n = 42$) did not have cognitive disorders, asthenic syndrome or depression. This group also tended to have better quality of life than other participants who had certain deviations in the screening tests ($p = 0.003$ for physical health and $p = 0.001$ for mental health).

We detected impaired cognitive functions in one quarter of the participants and five of them were younger than 35 years. This phenomenon occurs due to subclinical depression and depression.

Subclinical depression as a deviation that prevailed in the tests (74.6 % of the respondents) and its frequency was the same in all

age groups. Pre-asthenia and asthenia were established in one quarter of the participants (25.8 %); this means the disorder is rather frequent among researchers due to high psychoemotional loads.

All the researchers who had senile asthenia also suffered from depression or subclinical depression. Impaired cognitive functions did not have any correlations with pre-asthenia ($p > 0.05$).

Researchers' lifestyle. We examined what lifestyle was typical for the analyzed researchers using a version of Health Promoting Lifestyle Profile (HPLP) that was validated for Russia. As a result, we can state that in general the respondents' commitment to healthy lifestyle was quite satisfactory. The average score estimate amounted to 132.75 ± 56.31 for the whole group. Most analyzed researchers (73.7 %, $n = 157$) had a score estimate that fell within "good commitment to healthy lifestyle". The "excellent" score (more than 169) was detected only for 0.93 % ($n = 2$); 2.34 % ($n = 5$) of the respondents had a score lower than 90, which meant poor commitment to healthy lifestyle; 23.00 % ($n = 49$) had a "moderate" score (Table 3).

Having analyzed specific SF-36 scales, we detected the lowest scores for physical activity (on average, the score amounted to 12.28 ± 5.70, which meant "poor") and stress management (the average score was 19.26 ± 7.54, which meant "moderate"). The highest scores were detected as per "Interpersonal relationships" and "Nutrition" (the average scores were 28.47 ± 13.07 and 25.70 ± 11.8 accordingly, which meant "good"). Data might be inaccurate since the respondents filled in the questionnaire themselves.

We did not detect any statistically significant differences between the subgroups with various activity types ($p > 0.05$).

If we study the answers given to the HPLP questionnaire for the total group more profoundly, we cannot fail to notice low scores for the answers regarding physical activity. Seventy-three point seven percent of the respondents did not do any exercises regularly; 71.8 % did not have substantial physical loads three times a week; 80.6 % did not have any physical activity in their free time; 63.7 % did not do any power exercises; 63.12 % of the respondents stated they did not do sports with proper intensity; and 61.2 % did not have any physical loads in their everyday life. The overwhelming majority of the respondents noted that even if they did any sports, they did not usually take their pulse (66.8 %) or train until target pulse rates were reached (86.25 %).

As for nutrition, 72.3 % of the analyzed researchers preferred a diet with low cholesterol contents; 81.2 % tended to eat 2 to 4 portions of fruit every day. All the respondents (100 %) had from 3 to 5 portions of vegetables every day; 93.1 % had from 6 to 10 portions of complex carbohydrates every day; 58.0 % had 2 or 3 portions of milk products every day; 100 % tried not to have more than 2 or 3 portion of protein food; 88.7 % usually had breakfast. Nevertheless, 88.9 % usually failed to read labels on food products to examine their structure and 39.3 % did not limit sugar and sugar-containing food products in their rations.

Table 3

HPLP results in the total group and subgroups as per activity types

Scales	Total ($n = 213$)	Researchers ($n = 37$)	Researchers-physicians ($n = 75$)	Lecturers ($n = 101$)
Health self-responsibility	21.6 ± 9.44	22.97 ± 8.3	22.33 ± 10.21	20.35 ± 9.37
Physical activity	12.28 ± 5.70	12.11 ± 3.55	10.84 ± 3.81	13.27 ± 3.95
Nutrition	25.70 ± 11.8	25.52 ± 11.6	26.64 ± 11.52	25.21 ± 10.55
Spiritual growth	22.31 ± 10.7	23.73 ± 11.19	22.66 ± 8.59	21.28 ± 8.42
Interpersonal relationships	28.47 ± 13.07	29.30 ± 13.27	27.24 ± 10.76	28.75 ± 12.1
Stress management	19.26 ± 7.54	19.54 ± 9.23	19.02 ± 7.22	19.26 ± 6.28
Total score	132.75 ± 56.31	136.26 ± 58.81	131.73 ± 50.44	131.36 ± 52 ± 71

able 4

Aggregated data on the analyzed subgroups

Risk factor	Total (n = 213)	Researchers (n = 37)	Researchers-physicians (n = 75)	Lecturers (n = 101)
Cognitive disorders	9.85 %	10.8 %	10.6 %	8.9 %
Pre-asthenia	22.5 %	21.62 %	**26.6 %***	19.8 %
Asthenia	3.28 %	2.7 %	**4.0 %****	2.9 %
Subclinical depression	74.6 %	62.16 %	**81.3 %****	74.25 %
Senile depression	2.34 %	2.7 %	2.6 %	1.9 %
Low commitment to healthy lifestyle	2.34 %	2.7 %	**4.0 %***	0.9 %
Moderate commitment to healthy lifestyle	**23.0 %**	**24.3 %**	**24 %**	**21.7 %**
Low health self-responsibility	4.6 %	0 %*	0 %*	**9.9 %**
Low physical activity	**79.37 %**	**85.0 %**	**95.6 %* ****	**67.56 % ***
Improper nutrition	2.8 %	2.7 %	1.3 %*	**3.9 %**
Low spiritual growth	1.4 %	**2.7 %**	1.3 %	0.9 %**
Poor interpersonal skills	0.93 %	**5.4 %**	0 %**	0 %**
Poor stress management	2.34 %	0 %	**5.3 %* ****	0 %

N o t e : * means the difference from lecturers is authentic; ** means the difference form researchers is authentic, $p < 0.05$.

Apparently, the analyzed researchers tended to have rather poor stress management skills. Fifty-seven point five percent of them did not find enough time to relax every day; 82.5 % of the respondents did not use any special techniques to control stress; 93.6 % noted they could not find even 20 minutes a day to meditate or relax; 83.6 % of the respondents were not ready to slow down in their work to avoid excessive fatigue. Still, 86.8 % had enough sleep and 75.5 % of the respondents tried to find some balance between work and rest.

The analyzed researchers were quite responsible for their health since they were ready to contact a doctor in case of any unusual signs or unpleasant symptoms (71.8 %); they were interested in prevention (79.2 %) and alternative opinions regarding their diagnosis (84.4 %). However, 81.25 % of the respondents gave a negative answer to the question “Do you examine your body at least once a month?” Rather few respondents were interested in various health programs (11.25 %) and even fewer participated in them (3.75 %).

When it comes down to interpersonal relationships, the analyzed researchers were ready to discuss their problems with their family or friends (84.0 %), had a possibility to enter intimate relations (84.9 %) and tried to keep earnest relationships with those around them (95.4 %). Seventy-six point two percent of the respondents tried to resolve conflicts by discussion.

Although the score given to spiritual growth was average, most researchers were sure that they were developing positively (53.1 %); 96.1 % were focused on their future; 70.6 % pursued long-term goals; 69.3 % felt themselves at peace; 96.8 % were open for new challenges.

Risk factors that may cause a decline in researchers’ professional efficiency. Given all the obtained data, we can state that there was rather high prevalence of risk factors that may cause a decline in professional efficiency among the analyzed researchers. We detected probable cognitive disorders in 9.85 % and those disorders were not age-related; 3.28 % had signs of senile asthenia; 2.34 %, signs of senile depression. Two thirds of the respondents suffered from subclinical depression (74.6 %). One quarter of the researchers were not sufficiently committed to health lifestyle (25.34 %). Low physical activity detected in 79.3 % of the respondents was the major issue (Table 4).

When we divided the overall group into several subgroups with different activity types, we detected certain peculiarities related to distribution of risk factors that might cause a decline in professional efficiency. Thus,

pre-asthenia and asthenia were significantly more frequent among those researchers who combined scientific work with clinical practice ($p < 0.01$).

Subclinical depression was the least frequent among people who were involved only in research work; it was the most frequent among those combining research work with clinical practice (the difference between the subgroups was authentic at $p < 0.05$).

Researchers-physicians were committed to health lifestyle much poorer than others, especially in comparison with lecturers ($p < 0.01$); they were also rather bad at managing stress, worse than either researchers or lecturers ($p < 0.001$). As for physical activity, lecturers had the highest score; physicians, the lowest ($p < 0.01$) (Table 4).

Conclusions:

1) The prevalence of risk factors that might cause a decline in professional efficiency was rather high among the analyzed researchers. We detected cognitive disorders, which were not age-related, in 9.85 % of them; 3.28 % had signs of senile asthenia; 2.34 %, signs of senile depression. Two thirds suffered from subclinical depression (74.6 %). Only one fifth of the respondents (19.71 %, $n = 42$) did not have cognitive disorders, asthenic syndrome, or depression.

2) One quarter of the researchers were rather poorly committed to healthy lifestyle (25.34 %). Low physical activity detected in 79.3 % of the respondents was the major risk factor; others included improper nutrition, especially among those researchers who combined scientific work with teaching; poor stress management skills in physicians who combined research work and clinical practice; difficulties with interpersonal relationships among respondents who were involved only in research.

3) It is necessary to implement corporate programs aimed at prevention and rehabilitations for researchers in order to preserve their scientific activity and professional efficiency as well as to extend their professional longevity.

Funding. The study was accomplished within the frameworks of the fundamental research "Managing formation of researchers' efficient professional longevity" by the RF Ministry for Science and Higher Education.

Competing interests. The authors declare no competing interests.

References

1. Minnibaev T.Sh. Topical issues of university hygiene at the present stage. *Health, education of children and young adults in XXI century: Health & Education Millennium World congress*, 2004.

2. Ackerman P.L, Kanfer R., Goff M. Cognitive and noncognitive determinants and consequences of complex skill acquisition. *Journal of Experimental Psychology*, 1995, vol. 1, no. 4, pp. 270–304. DOI: 10.1037/1076-898X.1.4.270

3. Tucker A.M., Stern Y. Cognitive reserve in aging. *Curr. Alzheimer Res*., 2011, vol. 8, no. 4, pp. 354–360. DOI: 10.2174/156720511795745320

4. Gadzhiev G.D., Grechany G.V. Influence of industrial factors on indices of diseases of employees of scientific research institutes of the Irkutsk Centre of Science of the Siberian branch of the Russian Academy of Science. *Sibirskii meditsinskii zhurnal (Irkutsk)*, 2007, vol. 70, no. 3, pp. 70–73 (in Russian).

5. Ratai T.V., Tarasenko I.I. Nauchnye kadry: tendentsiya snizheniya sokhranyaetsya: ekspress-informatsiya ISIEZ NIU VShE «Nauka, tekhnologii, innovatsii» [Scientific personnel: the downward trend continues. Express information provided by ISSEK NRU HSE "Science, technology, innovation"]. ISIEZ NIU VShE, 2019. Available at: https://issek.hse.ru/data/2019/09/25/1540060251/NTI_N_145_25092019.pdf (19.06.2021) (in Russian).

6. Dellenbach M., Zimprich D. Typical intellectual engagement and cognition in old age. *Neuropsychol. Dev. Cogn. B Aging Neuropsychol. Cogn.*, 2008, vol. 15, no. 2, pp. 208–231. DOI: 10.1080/13825580701338094

7. Imlach A.-R., Ward D.D., Stuart K.E., Summers M.J., Valenzuela M.J., King A.E., Saunders N.L., Summers J. [et al.]. Age is no barrier: predictors of academic success in older learners. *NPJ Sci. Learn*., 2017, vol. 2, pp. 13. DOI: 10.1038/s41539-017-0014-5

8. Aschwanden D., Schumacher V., Zimmermann K., Werner C., Allemand M., Zimprich D., Martin M. Do Professors Better Maintain Cognitive Functioning in Older Age? *GeroPsych*, 2019, vol. 32, no. 1, pp. 5–17. DOI: 10.1024/1662-9647/a000201

9. Salthouse T.A. Mental Exercise and Mental Aging: Evaluating the Validity of the "Use It or Lose It" Hypothesis. *Perspect. Psychol. Sci*., 2006, vol. 1, no. 1, pp. 68–87. DOI: 10.1111/j.1745-6916.2006.00005.x

10. Head D., Kennedy K.M., Rodrigue K.M., Raz N. Age differences in perseveration: cognitive and neuroanatomical mediators of performance on the Wisconsin Card Sorting Test. *Neuropsychologia*, 2009, vol. 47, no. 4, pp. 1200–1203. DOI: 10.1016/j.neuropsychologia.2009.01.003

11. Singh-Manoux A., Kivimaki M., Glymour M.M., Elbaz A., Berr C., Ebmeier K.P., Ferrie J.E., Dugravot A. Timing of onset of cognitive decline: results from Whitehall II prospective cohort study. *BMJ*, 2012, vol. 344, pp. d7622. DOI: 10.1136/bmj.d7622

12. Eckert M.A. Slowing down: age-related neurobiological predictors of processing speed. *Front. Neurosci*., 2011, vol. 5, pp. 25. DOI: 10.3389/fnins.2011.00025

13. Shleptsova M.V., Frolova E.V. Prevalence of the geriatric syndromes in geriatric practice in outpatient clinic and possible ways of its correction. *Rossiiskii semeinyi vrach*, 2018, vol. 22, no. 2, pp. 30–36. DOI: 10.17816/RFD2018230-36 (in Russian).

14. Christensen H., Henderson A.S., Griffiths K., Levings C. Does aging inevitably lead to declines in cognitive performance? A longitudinal study of elite academics. *Personality and Individual Differences*, 1997, vol. 23, no. 1, pp. 67–78. DOI: 10.1016/S0191-8869(97)00022-6

15. Massé R., Poulin C., Dassa C., Lambert J., Bélair S., Battaglini A. The structure of mental health: higher-order confirmatory factor analyses of psychological distress and well-being measures. *Social Indicators Research*, 1998, vol. 45, no. 1, pp. 475–504. DOI: 10.1023/A: 1006992032387

16. Vilas Boas A.A., Morin E.M. Quality of working life in public higher education institutions: The perception of Brazilian and Canadian professors. *International Journal of Business and Social Science*, 2013, vol. 4, no. 12, pp. 67–77. Available at: http://www.ijbssnet.com/journal/index/2127 (11.08.2021).

17. Kuznetsova A.R. Osobennosti podgotovki nauchnykh kadrov dlya sistemy obrazovaniya v Rossiiskoi Federatsii [Features of training scientific personnel for the education system in the Russian Federation]. *Sovremennoe obrazovanie: tekhnologii, metodika, nauka: materialy vserossiiskoi nauchno-metodicheskoi konferentsii v chest' 65-letiya kafedry matematiki FGBOU VO «Bashkirskii gosudarstvennyi agrarnyi universitet»*, 2018, pp. 45–48 (in Russian).

18. De Paula A.V., Vilas Boas A.A. Well-being and quality of working life of university professors in Brazil. Quality of Life and Quality of Working Life. In: A.A. Vilas Boas ed. Chapter 10. IntechOpen: World's first Open Access book publisher, 2017, 312 p. DOI: 10.5772 /intechopen.70237

19. Maarof N.N.N.A., Shamsuddin N.R., Razali N.M., Hadi A.A., Ismail A. A comparative study of health-related quality of life among academician – A case study. 2012 International Conference on Statistics in Science, Business and Engineering (ICSSBE). Available at: https://www.researchgate.net/profile/Norin-Shamsuddin/publication/261389874_A_comparative_study_of_health_related_quality_of_life_among_academician_-_A_case_study/links/5db640f092851c577ecec9ee/A-comparative-study-of-health-related-quality-of-life-among-academician-A-case-study.pdf (07.10.2021).

20. Isayev A., Nikiforov G., Rodionova Ye. Psychology of professional health: a review of concepts. *Uchenye zapiski Sankt-Peterburgskogo gosudarstvennogo instituta psikhologii i sotsial'noi raboty*, 2019, vol. 32, no. 2, pp. 114–122 (in Russian).

Vasiliev M.D., Makarova E.V., Kostrov A.A., Palevskaya S.A., Smbatyan S.M. Assesment of scientists' lifestyle and risk factors affecting their professional efficiency. Health Risk Analysis, 2022, no. 2, pp. 98–106. DOI: 10.21668/health.risk/2022.2.09.eng

Received: 05.11.2021
Approved: 17.05.2022
Accepted for publication: 21.06.2022