

## Research Article,

# Sex Differences and Trends in Prevalence of Anxiety, Depression and Vital Exhaustion in Russia / Siberia from 1994 To 2017

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### Abstract:

**Purpose:** To determine gender differences in trends of anxiety, depression and vital exhaustion levels in an open population aged 25-64 years over long-term period - 23 years in Russia / Siberia (Novosibirsk).

**Methods:** Within the framework of the screening in 1994-95 under the WHO MONICA-psychosocial (MOPSY) program (n = 1527, 43% males, mean age 44.85 ± 0.4 years), in 2003-2005 under the international project HAPIEE (n=1650, 34.9% males, mean age 54.25±0.2 years), in 2013-2016 (n=975, 43.8% males, mean age 34.5±0.4 years) and 2016-2017 (n=663, 41.3% years 51.95±0.32 years) within the framework of the budgetary theme No. AAAA-A17-117112850280-2, random representative samples of men and women in one of districts in Novosibirsk were examined. Anxiety traits studied by means of the Spielberger test. Depression and vital exhaustion assessed by MOPSY questionnaires.

**Results:** 2/3 of the female population aged 25-64 years had high level of anxiety traits in 1994. It was highest in the younger age groups. High anxiety was found in less than half of the surveyed men, increasing with age. The maximum values of anxiety were noted in 2003-2005 in both genders. The decrease in the incidence of high anxiety which began in 2013-2016, remained only in the female part of the population aged 35-64y but in men the prevalence of anxiety returned to the levels of 1994.

**Depression** occurred in more than half of the female population in 1994. The overall prevalence among men was less than 30%. At the same time, the frequency of major D in women was 4-fold higher compared with men (p <0.001). Trends in prevalence in 2017 were mixed: a reduction in moderate levels and an increase in major depression in the youngest and oldest age groups.

The prevalence of high vital exhaustion in 1994 was 14.6% and 31% in men and women 25-64 years, respectively (p <0.001). An increase in high exhaustion from younger to older age groups was noted in both sexes. The downward trend in exhaustion in 2017 persisted only among women. At that moment for the first time men began to report high exhaustion more often than women over 23-year of follow-up (16.9% and 15.6% for men and women 35-64y, respectively; n.s.).

**Conclusion:** The prevalence of affective states is higher in females in general population. Long-term trends in decreasing the prevalence of anxiety, depression and vital exhaustion were not sustainable and returned to levels of 1994.

### Background:

Amid reports about the successes in reducing cardiovascular mortality, an increasing number of cases of depression (D) are being recorded worldwide. It is predicted that major D will become the leading disease in 2030, and is already that among women in some countries. Major depressive disorder in Canada showed a 75%

increase in disability between 1990 and 2010. And - this is the second largest after the prevalence of Alzheimer's disease. For comparison, in the United States, growth was 43%. At the same time, the ratio of women and men in the global rate of morbidity and disability from major depression has remained unchanged at about 2: 1 [1, 2]. Epidemiological studies estimated 50% adults

have at least one anxiety disorder over lifetime and 30% reporting past year anxiety [3]. According to the National Institute of Mental Health, the past year prevalence of anxiety disorders in the United States decreased slightly over the decade (1990-2003) and it was 23.4% in women and 14.3% in men [3]. More recent studies in Europe do not report any dynamics in anxiety disorders [4].

The term vital exhaustion (VE) proposed Appels A., et al. (1980) to indicate precursors of myocardial infarction. It is a mental state that denotes extreme fatigue, feelings of demoralization, and increased irritability. VE is thought to be a potential response to intractable problems in people's lives, in particular when they are unable to adapt to prolonged exposure of psychological stressors. Reports of the prevalence of VE few in number; in the literature, such "surrogates" as emotional burnout and chronic fatigue are often described [5]. The need for population-based study of sex differences and the dynamics of the prevalence of these affective states in Russia related with the lack of similar studies in our country where the study design (sample set, methods of recording psychological characteristics, etc.) is strictly followed by a single protocol. Thus, the purpose of our study was to establish gender differences in the dynamics of anxiety traits, depression, vital exhaustion levels in an open population of 25-64 years over a long-term period - 23 years in Russia / Siberia.

#### **Material and methods:**

The results of our study were obtained on the basis of a survey of the male and female population living in one of the districts of Novosibirsk. The examinations were carried out within the framework of screenings 1994-95, 2003-2005, 2013-2016 and 2016-2017. Under the III screening of the WHO program «Multinational Monitoring of Trends and Determinants of Cardiovascular Disease - Optional Psychosocial Substudy» (MONICA-MOPSY) representative sample of residents aged 25-64 years examined in 1994-1995 (n=1527, 43% males, mean age 44.85±0.4 years, response rate – 77.3%) [6]. In the course of another international project HAPIEE (Health, Alcohol and Psychosocial factors In Eastern Europe) persons aged 45-64 were examined in 2003-2005 (n=1650, 34.9% males, mean age 54.25±0.2 years, response rate –

66.5%) [7]. In the framework of the screening studies a random representative sample survey of the population aged 25-44 years conducted in 2013-2016 by the budget scientific research theme, Gov.Task № 01201282292 (n=975, 43.8% males, mean age 34.5±0.4 years, response rate – 71.5%). Within the framework of the budget theme No. AAAA-A17-117112850280-2 a survey of persons aged 35-64 was carried out in 2016-2017 (n=663, 41.3% males, mean age 51.95±0.32 years, response rate – 73.6%). The study included residents of the same district of Novosibirsk as in 1994-95, 2003-2005 and 2013-2016.

All samples were formed on the basis of electoral lists of citizens using a table of random numbers. A random mechanical selection procedure was used. The general survey was carried out according to the standard methods accepted in epidemiology and included in the MONICA program [6]. The methods were strictly standardized and complied with the requirements of the MONICA project protocol. Validation and processing of material according to the WHO MONICA-psychosocial program was carried out at the Information Collection Center of the MEDIS Institute in Munich, Germany (Institut für Medizinische Informatik und Systemforschung). Quality control was carried out in MONICA quality control centers: Dundee (Scotland), Prague (Czech Republic), Budapest (Hungary). The presented results were considered satisfactory. The screening survey program included registration of socio-demographic data according to the standard epidemiological protocol of the WHO MONICA-psychosocial program: identification number, place of residence, full name, date of birth, date of registration, gender, marital status, educational level, professional status. The levels of anxiety traits (AT) were assessed using the Spielberger test (subscale anxiety as a personality trait) [8]. Data interpretation was based on the following criteria: an anxiety sign score of less than 30 corresponded to a low level of anxiety (LLA); score from 31 to 44 corresponded to moderate level of anxiety (MLA); and a score of more than 45 indicates a high level of anxiety (HLA).

Depression was assessed using the form of the depression scale - the MOPSY test, consisting of 15 questions. To answer each question, 2 answers are provided: "Agree", "Disagree". The severity of depression was assessed as no depression (ND),

moderate (MD), major D.

The level of vital exhaustion was studied using the MOPSY questionnaire (based on Maastricht Vital Exhaustion Questionnaire adopted by MONICA protocol). The test consisted of 14 statements. There are 3 gradations for the answer to each statement: “Yes”, “No”, “I do not know”. The level of vital exhaustion was assessed as: no vital exhaustion, moderate, high. The tests were encoded in the construction of index components and the calculation of points in accordance with the proposed algorithm of the MONICA-MOPSY program. The subjects were asked to answer the questions of the scale themselves according to the instructions placed on the scale. Individuals who did not complete the questionnaire were not included in the analysis. Statistical analysis was performed using the SPSS software package version 11.5. The study participants were standardized by age groups in the analysis. To compare the indicators between screenings, the corresponding age groups were used. To check the statistical significance of differences between groups, we used: the chi-square test ( $\chi^2$ ). As a criterion of statistical significance the value of the chi-square was taken into account at a certain number of degrees of freedom. The reliability of analysis was accepted at a significance level of  $p < 0.05$ .

**Results:**

The prevalence of high levels of anxiety (HLA) in males in an open population of 25-64 years was significantly lower compared to females in 1994 (43.8% and 66.9%;  $p < 0.001$ ).

By 2003, there was an increase in the unfavorable level of anxiety traits by 15-17% in both gender, reaching 60.2% in male and 82.8% in female part of the population 45-64 years ( $p < 0.001$ ). These are the highest HLA levels for the entire twenty-three-year observation period. Women were more

likely to report HLA as in 1994. Prevalence of HLA in 2013-2016 markedly decreased in both gender of population aged 25-44 years, especially in men - 2 times (29.3% and 48.2% for men and women, respectively;  $p < 0.001$ ).

The trend of lower HLA levels remained only in the female part of the population aged 35-64y by 2016-2017. But the prevalence of HLA in men increased to levels of 1994. Moreover, there was a trend in the lining of the anxiety levels in men and women over the period (HLA: 44.7% and 49%, respectively;  $p < 0,05$ ). The low level of anxiety did not exceed 10% during the assessed period, with the exception of 2013-2016, when the rate of HLA in male population aged 25-44 was 14% ( $p < 0.001$ ).

The study of sex differences in anxiety levels among age groups revealed the following observations (see Table 1). Among the male population in 1994, there was a clear linear relationship in the increase in high anxiety prevalence from younger to older age groups: from 38.3% in the 25-34 age group, to 60.4% in the 55-64 age group. Among women, on the contrary, high levels of anxiety were more common in young age groups 25-34 and 35-44 years - 64.6% and 69.2%, respectively ( $p \leq 0.001$ ). In 2003-2005, with the exception of men 45-54 years old, there was a significant increase in the incidence of HLA in comparison with the similar group in 1994; especially in the 55-64 age group, reaching maximum values of 68% for men and 86.5% for women ( $p < 0.001$ ). In 2013-2016, a significant decrease in the prevalence of HLA in the groups of 25-34 and 35-44 years in both genders was established, in comparison with similar age categories in 1994. Youngest women had demonstrated the most significant decrease in 1.5times( $p < 0,001$ ).Table

**Table1: Gender differences in the dynamic of anxiety traits levels in age groups of a population aged 25-64 years in 1994 – 2017.**

Levels		25-34 years				35-44 years				45-54 years				55-64 years				25-64 years			
		M		F		M		F		M		F		M		F		M		F	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Low	199	12	6.8	0	0	4	2.2	1	0.6	0	0	1	0.5	0	0	2	1.2	16	4.5	1	0.3
Moderate	4	96	54.9	56	35.4	86	48.6	48	30.2	57	42	85	46.2	67	39.6	76	45	18	51.7	104	32.8
High		67	38.	10	64.	87	49.	11	69.	79	58	98	53.	10	60.	91	53.	15	43.	212	66.

		3	2	6		2	0	2				3	2	4		8	4	8		9	
Total		17 5	10 0	15 8	10 0	17 7	10 0	15 9	10 0	13 6	10 0	18 4	10 0	16 9	10 0	16 9	10 0	35 2	10 0	317	10 0
		$\chi^2=28.982$ df=2 p<0.001				$\chi^2=14.338$ df=2 p=0.001				$\chi^2=1.39$ df=2 p=0.499				$\chi^2=3.193$ df=2 p=0.203				$\chi^2=15.937$ df=2 p<0.001			
Low	200																				
Moderate	5																				
High																					
Total																					
Low	201	31	18.8	15	7	29	11.1	15	4.5									60	14.1	30	5.5
Moderate	3	97	58.8	11	53.1	14	55.3	14	42.1									24	56.7	254	46.4
High		37	22.4	85	39.9	88	33.6	17	53.4									12	29.3	264	48.2
Total		16	10	21	10	26	10	33	10									42	10	548	10
		$\chi^2=19.89$ df=2 p=0.0001				$\chi^2=27$ df=2 p=0.0001												$\chi^2=45.6$ df=2 p=0.0001			
Low	201					2	2.9	10	11.2	3	4	15	10.3	7	3	8	5.4	12	4.5	33	8.6
Moderate	7					33	47.8	38	42.7	45	56	53	36.3	57	48.7	72	48.3	13	50.8	163	42.4
High						34	49.3	41	46.1	32	40	78	53.4	53	45.3	69	46.3	11	44.9	188	49
Total						69	10	89	10	80	10	14	10	11	10	14	10	26	10	384	10
						$\chi^2=3.869$ df=2 p>0.05				$\chi^2=9.418$ df=2 p<0.01				$\chi^2=0.060$ df=2 p>0.05				$\chi^2=6.740$ df=2 p=0.035			

Women of all age groups were in the lead by the level of HLA over men in 2013 as in previous two decades. The distribution of anxiety levels in 2016-2017 differed from other periods. Thus, for the first time, the incidence of HLA in men aged 35-44 years was higher compared to women of the same age group: 49.3% vs 46.1%, although the differences did not reach statistical significance. There was a tendency towards gender parity between the levels of HLA in the oldest age category (45.3% and 46.3%, for men and women, respectively). An apparent increase in low anxiety among both sexes was observed in the 2013-2017 periods. Males were more likely to have low anxiety level which reached a peak 18.8% in those aged 25-34y in 2003-05. In women, low anxiety for the first time exceeded the 10% in 2016-2017 at the age categories 35-44 and 45-54 years (p <0.01). Rates of low anxiety in women prevailed over men in all age groups during this time period. Depression (D) occurred in more than half of the female population aged 25-64 in 1994. The

prevalence of D among men was less than 30% (Table 2). At the same time, rates of major D were 4-fold higher in women (p <0.001). The share of women with D decreased by 18% by 2003-2005 while male's proportion remained unchanged. At the same time, there was a significant decrease in the gap of major D prevalence by gender: 2.6% in men and 4.7% in women 45-64 years (p <0.001). The prevalence of D among the male population reached its peak values for 30.5% in 2013-2016 over 23-year period. Women also showed an increase in total D but the values did not reach the levels seemed in 1994. It should be noted that the increase in D levels occurred as a result of changes in the structure of D levels due to an increase in major D rates in both genders. The prevalence of major D in young women was the highest in 2013-2016 as well as in opposite sex during the whole of observation (9.4% and 16.4%, for men and women 25-44 years, respectively (p <0.001). A slight decline in the levels of total D compared to the previous period occurred by 2016-2017. The share

of persons without D increased to 73% in men and 62.5% in women which approached the levels seemed in 2003. But the prevalence of major D remained at a higher level than in 1994: 5.6% in men and 14.3% in women aged 35-64 years ( $p < 0.01$ ). In 1994, the prevalence of major D dominated in women at all age groups with the exception of 45-54 years where the rate of major D was 2 times higher in men. The prevalence of large D was highest among women 35-44 and 55-64 years: 13.6% and 18.6%, respectively ( $p < 0.001$ ). Men showed vanishingly low levels of major D, especially in the younger age groups 25-34y and 35-44y. In 2003-2005, a decrease in major D to 1.3% was noted in male population 45-54 years. The share of men aged 55-64y with a major D did not change and almost equaled with women the same age group. Major D increased by 2% in women 45-54 years in comparison with 1994 but there was a more than 4-fold decrease in the level of major D in the group 55-64y ( $p < 0.05$ ). There was also a decrease in the prevalence of moderate depression level but more likely in female population - by 15-16% in comparison with the

1994. In 2013-2016, there was a significant increase in the levels of major D among men and women in young age groups compared to 1994. At the same time, the incidence of moderate D in the female population significantly decreased. It enlarged share of women without depression to 59.6% and 54.9% for those ones aged 25-34 and 35-44 years. Whereas the proportion of men with moderate and no depression did not change significantly in these age groups ( $p < 0.01$ ). The prevalence of major D in 2016-2017 did not change in males 35-44 year compared to the previous period and was equal to corresponding level in women the same age group (n.s.). The rate of major D was not so high in older men and did not exceed 4%. In contrast, women aged 55-64 showed the highest values 20.1% over the entire history of observations ( $p < 0.001$ ). Despite the growth of major D in the oldest age group of women the share of people without D in male and female populations 45-54 and 55-64 years was higher than in 1994 and, to a greater extent, corresponded to the indicators of 2003-05.

**Table 2. Gender differences in the dynamic of depression levels in age groups of a population aged 25-64 years in 1994 – 2017.**

Levels		25-34 years				35-44 years				45-54 years				55-64 years				25-64 years			
		M		F		M		F		M		F		M		F		M		F	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Major	1994	1	0.6	10	9.7	3	1.8	18	13.6	9	6.9	1	2.9	6	4	8	18.6	19	3.1	37	11.8
Moderate		39	23.4	44	42.7	39	23.9	53	40.2	35	26.9	17	48.6	44	29.5	20	46.5	15	25.7	134	42.8
No D		12	76	49	47.6	12	74.1	61	46.2	86	66.2	17	48.6	99	66.4	15	34.9	43	71.3	142	45.4
Total		16	107	10	103	16	103	13	102	13	100	35	100	14	109	43	100	60	109	313	100
		$\chi^2=28.674$ df=2 $p < 0.001$				$\chi^2=29.695$ df=2 $p < 0.001$				$\chi^2=6.219$ df=2 $p=0.045$				$\chi^2=18.210$ df=2 $P < 0.001$				$\chi^2=66.724$ df=2 $p < 0.001$			
Major	2005	4	1.3	28	5.1	11	4	22	4.2	15	2.6	50	4.7	15	4	22	4.2	15	2.6	50	4.7
Moderate		75	24.7	17	32.9	62	22.8	16	31.1	62	22.8	16	31.1	62	22.8	16	31.1	13	23.7	340	31.7
No D		22	74.5	34	62.7	19	73.9	33	64.6	19	73.9	33	64.6	19	73.9	33	64.6	42	73.4	684	63.7
Total		30	104	55	104	27	102	52	100	27	102	52	100	27	102	52	100	57	106	107	100
		$\chi^2=15.036$ df=2 $p=0.001$				$\chi^2=6.088$ df=2 $P=0.048$				$\chi^2=17.541$ df=2 $p < 0.001$											
Major	2013	11	6.7	36	16.9	29	11.1	54	16.1									40	9.4	90	16.4
Moderate		36	21.8	50	23.5	54	20.6	97	29									90	21.1	147	26.8
No D		11	71.5	12	59.7	17	68.9	18	54.9									29	69.7	311	56.8
Total		16	105	21	103	26	102	33	100									42	107	548	100

		$\chi^2=9.97$ df=2 p=0.007				$\chi^2=11.08$ df=2 p=0.004								$\chi^2=18.531$ df=2 p<0.001			
Major	2017	8	11.6	11	12.4	3	4	14	9.5	4	3.4	30	20.1	15	5.6	55	14.3
Moderate		11	15.9	22	24.7	17	21	36	24.7	29	24.8	31	20.8	57	21.4	89	23.2
No D		50	72.5	56	62.9	60	75	96	65.8	84	71.8	88	59.1	19	7.3	240	62.5
Total		69	100	89	100	80	100	146	100	117	100	149	100	266	100	384	100
		$\chi^2=1.980$ df=2 p=0.372				$\chi^2=3.239$ df=2 p=0.199				$\chi^2=16.430$ df=2 p<0.001				$\chi^2=13.779$ df=2 p<0.002			

**Table 3. Gender differences in the dynamic of vital exhaustion levels in age groups of a population aged 25-64 years in 1994 – 2017.**

Levels		25-34 years				35-44 years				45-54 years				55-64 years				25-64 years			
		M		F		M		F		M		F		M		F		M		F	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
High	1994	8	4.8	23	22.3	23	13.9	45	33.3	29	22.5	10	25	29	19.3	26	44.8	89	14.6	104	31
Moderate		80	48.5	49	47.6	78	47.3	63	46.7	65	50.4	17	42.5	95	63.3	19	32.8	31	52.8	148	44
No VE		77	46.7	31	30.1	64	38.8	27	20	35	27.1	13	32.5	26	17.3	13	22.4	20	33.2	84	25
Total		165	100	103	100	165	100	135	100	126	100	40	100	150	100	58	100	609	100	336	100
		$\chi^2=21.085$ df=2 p=0.001				$\chi^2=20.967$ df=2 p=0.001				$\chi^2=0.785$ df=2 p=0.675				$\chi^2=17.991$ df=2 p<0.001				$\chi^2=36$ df=2 p<0.001			
High	2005									50	16.4	17	31	59	21.7	14	28.5	109	18.9	320	29.8
Moderate										17	57.4	30	54.7	15	57.7	31	60.4	33	57.1	617	57.4
No VE										80	26.3	79	14.3	56	20.6	58	11.2	136	23.6	137	12.8
Total										304	100	55	100	272	100	52	100	576	100	1074	100
		$\chi^2=10.112$ df=2 p=0.006				$\chi^2=26.23$ df=2 p=0.001				$\chi^2=31.794$ df=2 p<0.001				$\chi^2=14.38$ df=2 p=0.001				$\chi^2=4.086$ df=2 p=0.13			
High	2013	7	4.2	24	11.3	19	7.3	65	19.4									26	6.1	89	16.2
Moderate		52	31.5	82	38.5	91	34.7	13	40.3									143	33.5	217	39.6
No VE		106	64.2	107	50.2	152	58.5	13	40.3									258	60.4	242	44.2
Total		165	100	213	100	262	100	33	100									427	100	548	100
		$\chi^2=10.112$ df=2 p=0.006				$\chi^2=26.23$ df=2 p=0.001								$\chi^2=35.77$ df=2 p=0.001							
High	2017					4	5.8	10	11.2	14	17.5	17	11.6	27	23.1	33	22.1	45	16.9	60	15.6
Moderate						22	31.9	38	42.7	19	23.7	68	46.6	56	47.9	67	45	97	36.5	173	45.1
No VE						43	62.3	41	46.1	47	58.8	61	41.8	34	29	49	32.9	124	46.6	151	39.3
Total						69	100	89	100	80	100	145	100	117	100	149	100	266	100	384	100
		$\chi^2=4.425$ df=2 p>0.05				$\chi^2=11.401$ df=2 p<0.01				$\chi^2=0.451$ df=2 p>0.05				$\chi^2=4.927$ df=2 p=0.086							

The prevalence of high VE in 1994 was 2 times higher in women compared to men of 25-64 years (14.6% and 31%, respectively;  $p < 0.001$ ). Rates of moderate levels of VE were higher men (Table 3).

In 2003-2005, there was an increase in the moderate VE levels and a decrease in the proportion of those who did not experience vital exhaustion, especially in female population (23.6% and 12.8% for men and women aged 45-64 without VE, respectively). But there remained a significant gap in high VE levels by sex.

The levels of high VE have significantly decreased in 2013-2016: 6.1% in men and 16.2% in women of 25-44 years. The same was for moderate VE: 33.5% and 39.6%, respectively ( $p < 0.01$ ). The proportion of individuals without VE was still higher in male population. In 2017, there was an up-ward tendency towards the high levels of VE in male population aged 35-64 years. For the first time over 23-year of follow-up, men began to report high VE more often than women (16.9% and 15.6% for men and women aged 25-44, respectively; n.s.). In 1994, rates of high VE nonlinear grew-up from younger to older age groups in both genders. Rates of high VE peaked in men of 45-54y at 22.5% (n.s.) and in women of 55-64y at 44.8% ( $p < 0.001$ ). By 2003-2005, the gap in the prevalence of high VE between men and women narrowed down in the oldest age group (21.7% and 28.5%, for men and women, respectively;  $p < 0.01$ ). But the decline of high VE in this group of women was mediated by the increase in moderate VE. Thus, the share of people without VE was at the lowest values over 23-years of observation. In 2013-2016, a significant decrease by 11-16% in the incidence of high VE occurred in female population of 25-34 and 35-44 years. But the same was observed in men 35-44 years ( $p < 0.01$ ). Similar trends were observed for moderate VE in all age groups. In 2016-2017, the decline of high VE continued in the age group 35-44y in both genders (5.8% and 11.2%, for men and women, respectively; n.s.). Concerning the older age categories, the decrease of high VE found only in women aged 45-64 years, whereas in men of this age vital exhaustion levels rose slightly in comparison with 2003-05. Thus, for the first time, levels of high VE were higher in men compared to women aged 45-54 years by 5% ( $p < 0.01$ ) and 1% in the 55-64 age group (n.s.). Moderate levels of VE also decreased in those aged 45-54 and 55-64 years. It should be noted that in 2016-2017, the

share of people not experiencing VE was higher in men and women in all age groups compared with the previous explored periods.

### Discussion:

The results of the study showed that a high level of anxiety traits was found in 2/3 of the female population aged 25-64 years in 1994. High anxiety was found in less than half of the surveyed men. There was a definite linear relation in growth-up of HLA rates from younger to older age groups in male population. On the contrary, high levels of anxiety traits were in women aged 25-34 and 35-44 years.

In 2003-2005, the maximum values of HLA were found in both genders, peaked 68% in men and 86.5% in women aged 55-64 over 23-years of explored period. The prevalence of HLA was 22.6% higher in women compared to men as in 1994.

The study of gender differences in National Comorbidity Survey and Collaborative Psychiatric Epidemiology Surveys showed the prevalence of anxiety in the United States fell not significantly from 1990 to 2003 and it was reported by 30% of women and 20% of men [3, 9]. This is lower than what is presented in our study. Likewise, comparisons of data from the European Union showed no significant change in prevalence rates for anxiety disorders between 2005 and 2011. And although anxiety was more often recorded among the female population, its prevalence, on the contrary, was higher among middle-aged Europeans [10-11].

Significant differences with our prevalence results are associated with the use of different anxiety assessment tools. In our study, anxiety is considered as personality trait. Other researchers evaluated clinical episodes that included panic disorder, generalized anxiety disorder, agoraphobia, specific phobia, social anxiety disorder (social phobia), post-traumatic stress disorder, obsessive-compulsive disorder, and separation anxiety disorder. Severe anxiety was observed in 22.8% of the US adult population, and mild / low anxiety levels were observed in 43.5% of the sample. In terms of age groups, the highest rates of anxiety was found in those aged 18-29 and 30-44 years - 22.3% and 22.7%, respectively, while the prevalence of anxiety did not exceed 9% among Americans aged 60 and older [3, 9]. Such a distribution with an emphasis on young age groups of women was typical in 1994 in the population we studied.

In 2013-2016 there was a significant fall of HLA prevalence in the groups of 25-34 and 35-44 years in both genders in Novosibirsk compared with similar age categories in 1994. As in previous periods, rates of HLA were higher in women over men in all age groups. Such a favorable trend by 2016-2017 was fixed only in female part of the population aged 35-64y but the prevalence of HLA in men returned to the levels seemed in 1994. Thus, for the first time, the incidence of high anxiety in men of 35-44 years was higher than in women the same age, although the differences did not reach statistical significance. There was also a trend towards parity in anxiety levels among men and women in older age groups during this time period.

Similar gender equality in levels of anxiety was obtained in a study of Iranian students [12]. However, these results are not relevant to our study as this study was conducted in the age group of 10-13 years. In our study the leveling off in anxiety rates was due to the increase of HLA in male population in 2016-2017. Increasing the levels of anxiety among men, probably due to the peak values of social tension against the backdrop of the economic crisis that began after 2014. The HLA values in men reached the values of 1994 and, as then, it was associated with socio-economic shocks. Subsequently, we should expect similar changes among the female population. Our findings showed the prevalence of major D in men increased with age and was unexpectedly higher in those aged 45-54 years but the share of women with moderate D was 20% higher compared to men the same age in 1994. It should be noted major and moderate D were encountered unreasonably often, especially in women during this time period. Only a third of females aged 55-64 had no depression in 1994 and the incidence of major D peaked 18.6% in this age group. Investigators from Nepal found the prevalence of moderate depression is higher other levels and noted significant gender differences in the age group 41-65 years [13]. A similar picture is observed in our study. The 1994 year looks especially indicative when rates of moderate D was the highest in the 45-54 and 55-64 age groups, reaching 48% among the female population, significantly exceeding those in men. Despite the fact women aged 45-54 years with major D in 2003 demonstrated growth-up by 2% in comparison with 1994, a 4-fold drop in rates of major D in the 55-64y group was reflected in the overall decline during that period. An

epidemiological study in the Netherlands found that depressive disorders were reported by 24.4% of women and 13.1% of men. From 1996 to 2009 the prevalence of past year mood disorders, the predominant share of which are depressive disorders, decreased. The authors explain this fall by socio-economic reasons. [4].

According to our results, growth-up of major D levels in younger men reduced the gender gap in 2013 (11.1% and 16.1% for men and women of 35-44 years, respectively).

2017 was marked by mixed trends: high levels of major D persisted in men aged 35-44 years and even an explosive increase of major D was noted in women of 55-64 years; at the same time, the share of people without D in the population aged 45-64 years of both gender was higher than in 1994.

In different time of observation the prevalence of D differed in age groups but rates of major D reached a peak 20% in oldest women aged 55-64y in 2017. This is consistent with recent Eurostat data showing an increase of depression rates from younger to older age groups. Although rates of depression in northern countries such as Finland, Sweden, Iceland were higher in younger age groups peaked at 18.7% in group 25-34 years [14]. But even in our study the picture of the prevalence depression in younger age groups was challenging. Especially in the male population where the growth of major D has exceeded the 10% since 2013. Our data allow us to change the attitude towards men of 35-44 years, since underestimation of the depression incidence in this age group is highly likely. Distribution by sex was studied in 2006-2009 and 2013-2015 in the first and second waves of the European health interview survey (EHIS). The proportion of people with depressive disorders was higher in women compared to men in each of the EU member states [15]. Portugal recording the largest gender gap: the share of Portuguese women reporting depression was 11.3 percentage points higher than the corresponding share for Portuguese men. The third wave of the European health interview survey (EHIS) was planned to start in 2019, but the COVID-19 pandemic is delaying the emergence of new data that would help understand the current trend in D prevalence by sex and age in the Eurozone countries. There are several possible explanations for why depression is less common in men. One of them is related to gender bias in diagnosis. Several studies had shown that when men seek help for

depression, health care workers are more likely to miss depression [16-17]. Depression is seen as a diagnosis related to women; thus, health care providers may not consider depression when assessing males. Although men are less likely to suffer from depression than women this affective state is still one of the most common mental disorders in men (12%) [17].

The prevalence of high VE in 1994 was 2-fold higher in women compared with men in an open population of 25-64 years (14.6% and 31% for men and women, respectively;  $p < 0.001$ ). With regard to age groups, in 1994 a non-linear increase in rates of high VE was found from youngest to oldest men and women. Further dynamics in 2003-2005 showed an increase in the moderate VE levels. This significantly reduced the proportion of those who did not experience vital exhaustion, especially in female population. The gender gap in high VE levels was not uniform across age groups. The trend towards a significant decrease in high and moderate levels of VE in both genders began in 2013-2016 and remained only in the group of 35-44 years in 2017. In the older age groups, the decrease in vital exhaustion occurred only in female population of 45-64 years, while levels of exhaustion did not decrease in men the same age but slightly increased in comparison with 2003. At that moment, for the first time men began to report high exhaustion more often than women over 23-year of follow-up (16.9% and 15.6% for men and women 35-64y, respectively; n.s.). Gender differences in response features to distress and the manifestation of VE are especially important. Despite the fact that the frequency of negative affects is higher among women, the association of VE with cardiovascular events is more common among men. At the same time, the ability to cope with psychological difficulties and better respond to psychotherapeutic intervention is inherent in women to a greater extent [18]. According to The Copenhagen City Heart Study the prevalence of moderate and high VE levels measured between 1991 and 1994 was 25% in the population, of which 58.5% were women. It should be noted the studied population was quite old in this survey: the average age was 60 years. [19]. In a large epidemiological study in the United States high VE levels were observed in 24% of study participants and moderate VE observed in 44% of those surveyed. Women were more likely than men to report high VE levels [20]. Our findings are troubling not only about high levels of affective

states in male and female population. These disorders are known to be associated with lower odds of high school or college graduation and getting a good level of degree, as well as unemployment and a higher risk of family divorce [21-23]. The relationship of these psychological characteristics with threatening cardiovascular events [24] requires taking into account the psychosocial phenomenon in assessing the risk of cardiovascular diseases [25, 26].

### Conclusions:

1. A high level of anxiety traits was found in 2/3 of the female population aged 25-64 years in 1994 and it was highest in younger age groups. High anxiety was found in less than half of the surveyed men, increasing with age. The maximum values of anxiety in both genders were in 2003-2005. The decline of high anxiety incidence began in 2013-2016 and remained only in females aged 35-64y. But the prevalence of anxiety in men returned to the levels of 1994.
2. Depression occurred in more than half of the female population in 1994. The overall prevalence among men was less than 30%. At the same time, rates of major D in women were 4-fold higher compared with men. Trends in prevalence in 2017 were mixed: a reduction in moderate levels and an increase of major depression in the youngest and oldest age groups.
3. The prevalence of high VE in 1994 was 2-fold higher in women compared with men in an open population of 25-64 years. An increase in high exhaustion from younger to older age groups was noted in both gender. The downward trend in exhaustion in 2017 persisted only among women. At that moment for the first time men began to report high exhaustion more often than women over 23-year of follow-up.

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