

Association of Self-Perceived Health with Social and Psychological Environment, the Mode of Life and Cardiovascular Risk Markers in Middle-Aged Men – Residents of Moscow

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Aim. Estimation of the correlation of self-perceived health (SPH) with social and psychological environment, lifestyle and cardiovascular risk markers in middle-aged men.

Material and methods. A total of 301 men aged 41-44 years were examined. The study included clinical examination and interrogation using a standard form. Physical activity was estimated with the help of the International Physical Activity Questionnaires, the level of psychosocial stress – with the Reeder scale, signs of vital exhaustion with the Maastricht Questionnaire Vital Exhaustion Scale. To evaluate the mode and quality of life the questionnaire developed by I.A. Gundarev was used. All the examined people were divided in three groups according to the distribution of SPH rates by tertiles: the group 1 (from 7 to 60 scores) – bad health, the group 2 (61-79 scores) – satisfactory and the group 3 (80-100 scores) – good health.

Results. Parameters of the social and psychological environment of middle-aged men were the basic determinates of their health self-perception, at that majority of the indices of the quality and mode of life were independent of family material well-being. Bad SPH in middle-aged men was determined by such parameters as: increased blood pressure (BP), abdominal obesity, excessive alcohol consumption, psychosocial stress, vital exhaustion, low physical activity. Material wealth influenced systolic BP level, the waist/hips circumference ratio, a number of cigarettes per day and thus the SPH status. The most significant determinants of SPH were the level of personal happiness, nervous stress at work, support by family, sports activities, working conditions, total cholesterol level, satisfaction with own work.

Conclusion. When working on programs focused on public health improvement the social, psychological and behavioral determinants of health self-perception must be considered.

Keywords: self-perceived health, the quality of life, social and psychological environment, cardio-vascular diseases risk factors.

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Ассоциация самооценки здоровья с социально-психологической средой, образом жизни и маркерами риска сердечно-сосудистых заболеваний у мужчин среднего возраста проживающих в г. Москве

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Цель. Анализ ассоциации самооценки здоровья (СЗ) с социально-психологической средой, образом жизни и маркерами риска сердечно-сосудистых заболеваний у мужчин среднего возраста.

Материал и методы. Обследован 301 мужчина в возрасте 41-44 года. Исследование включало клиническое обследование, опрос по стандартной анкете. Физическая активность оценивалась с помощью опросника International Physical Activity Questionnaires, уровень психосоциального стресса – по шкале Ридера, признаки жизненного истощения – по The Maastricht Questionnaire Vital Exhaustion Scale. Для оценки образа и качества жизни мужчин использовали опросник, разработанный И.А. Гундаровым. Все обследованные были распределены по СЗ на три группы в зависимости от распределения показателей СЗ по терцилям: 1-я группа (от 7 до 60 баллов) – плохое, 2-я группа (61-79 баллов) – удовлетворительное и 3-я группа (80-100 баллов) – хорошее здоровье.

Результаты. Факторы, характеризующие социально-психологическую среду мужчин среднего возраста, в основном определяют их СЗ, при этом большинство показателей качества и образа жизни не зависит от материального благосостояния семьи. Повышенное артериальное давление (АД), абдоминальное ожирение, избыточное потребление алкоголя, психосоциальный стресс, жизненное истощение, низкая физическая активность определяют плохую СЗ мужчин среднего возраста, а материальное благосостояние оказывает влияние на уровень систолического АД, окружность талии/бедер, количество выкуриваемых сигарет и, соответственно, на показатель СЗ. Наиболее значимыми детерминантами СЗ являются уровень личного счастья, нервные нагрузки на работе, поддержка семьи, занятия физической культурой и спортом, условия труда, уровень общего холестерина, удовлетворенность своей работой.

Заключение. При разработке программ, направленных на улучшение здоровья населения, необходимо принимать во внимание социально-психологические и поведенческие детерминанты самооценки здоровья.

Ключевые слова: самооценка здоровья, качество жизни, социально-психологическая среда, факторы риска сердечно-сосудистых заболеваний.

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Public health is a significant social and economic resource of national development; it depends on numerous objective and subjective factors of every person's life activity [1,2]. Evidences of strong correlation between behavior, life and working conditions with health status have led to a new understanding of how significantly people's health is sensitive to their social environment [3]. The index of self-perceived health (SPH) was recommended by the World Health Organization (WHO, 1996) as one of the principal parameters in the population's health and quality of life monitoring [4]. Simplicity and possibility of health status self-assessment with no involvement of health care worker have contributed to major distribution of this subjective assessment in practice [5].

SPH was shown to strongly correlate with mortality, physical and psychological status as well as with socioeconomic status and well-being of a person [6]. Subjective perception of own health is the strong predictor not only of morbidity, mortality and disability, but also of an individual's psychological and socioeconomic well-being and efficacy of functioning of the health care system [7-9]. Behavioral risk factors of cardiovascular diseases (CVD), such as smoking, alcohol abuse, low physical activity and improper feeding are also associated with SPH [10].

Despite the widespread use of SPH in scientific works of recent years, association of such factors as physical and psychological health, behavioral markers of risk, socioeconomic environment and other parameters of human life activities with the SPH status remains understudied.

The aim of the study was to estimate association of SPH with social and psychological environment, lifestyle and cardiovascular risk factors in middle-aged men.

Material and methods

An initial representative population-based sample of boys (Moscow schoolchildren) born in 1971-1972 years was formed in 1984 for prospective follow-up on cardiovascular risk factors changes. Detailed description of sampling was presented earlier [11]. The total of 7 examinations had been performed during 32 years of the prospective follow-up. After 32 years (the seventh visit) we only managed to examine 301 (30%) representatives of 1005 initially enrolled people. Mean age of the examined males was 42.9 years.

The examination included: survey with a standard questionnaire (the passport data, information of education, social status, personal and family history, physical activity and bad habits – smoking, alcohol consumption); three-time blood pressure (BP) measurement; the measurement of weight and height; waist and hips circumferences (WC, HC); assessment

of total cholesterol (TC), high density lipoprotein cholesterol (HDL-C), triglycerides (TG) and low density lipoprotein cholesterol (LDL-C) levels. For estimation of overweight and obesity the body mass index (BMI) was used. The WC/HC and WC/height ratios were calculated to evaluate abdominal obesity presence.

The Reeder's test (L.G. Reeder et al., 1969) adapted by O.S. Kopina et al. (1989) was used as the method of the stress level express diagnostics. The examined men were divided into three groups in accordance with the psychosocial stress level using generally accepted criteria [12]: high (1.00-2.00 scores), middle (2.01-3.00 scores) and low (3.01-4.00 scores) stress.

Vital exhaustion was assessed with the help of the Maastricht Questionnaire Vital Exhaustion Scale (MQVE) short version (14-item) [13]. Vital exhaustion is determined as a state of general weariness, absence of energy, increased irritancy and feeling of demoralization which is usually resulted from longtime mental stress. Maastricht Questionnaire includes 14 items describing different aspects of vital exhaustion with scores ranging from 0 to 14.

The life mode and quality were estimated using the questionnaire developed by I.A. Gundarov [14]. We analyzed the following parameters: family material well-being, personal income, housing condition, ecological status and living conditions in the place of residence, marital status and children presence, variety and satisfaction by nutrition, love and sexual feelings, spiritual needs, social support and communication with friends and also an occupation and public position. The quality of life was estimated by the respondents using a 100-score scale. In accordance with the distribution of the SPH rates by tertiles all examined people were divided in three groups: the group 1 (7-60 scores) – bad health, group 2 (61-79 scores) – satisfactory health and group 3 (80-100 scores) – good health. Such scoring of SPH is in line with the WHO classification [4].

Statistical analysis of the data included description of quantitative and qualitative variables. Quantitative values are presented as arithmetic mean (M) with 95% confidence interval (95%CI). Kolmogorov-Smirnov test was used to check the normality of the distribution of quantitative variables as a tool for selection of statistical tests for further analysis. To compare the three groups by the studied variables we used the one-way variance analysis (ANOVA) with post hoc comparisons by the multiple t-test with no alpha level correction – the LSD (Least Significant Difference) test. Analysis of effects of covariates and interaction of covariates with the factors was performed in the frame of the General Linear Model. Degree of consistency of changes in factor and dependent variables was estimated with the Spear-

man's rank correlation coefficient. The multiple linear regression model analyzed impact of several predictors on a response variable.

The critical value of the significance level (p) was assumed as 0.05. Statistical data processing was performed using the IBM SPSS Statistics v.23.

Results and discussion

Fig. 1 shows serialized mean values of the quantitative characteristics of quality and mode of the life in the examined sample of 41-44-year-old men. It is obvious that family, personal health, psychical equilibrium and material wealth are the principal life priorities in middle-aged men. In accordance with the distribution of life values, presented in fig. 1, men of this age are less interested in amusements, sports, safety and spiritual needs. The study of I.E. Kuprianova et al. had also demonstrated that health in line with some other indices is one of the basic characteristics of the quality of life [15].

So, family, personal health, psychical equilibrium and material wealth are the principal life priorities in middle-aged men while amusements, sports, safety and spiritual needs are less important. These data must be considered at development of social programs focused on improvement of the quality and mode of life and public health promotion.

The mean score of SPH in the examined group of men was 66.8 of the 100-score scale. In accordance with the results of a population-based research men of almost all age categories reveal overestimated SPH as compared to women despite higher mortality rates in the male population as compared to female one. Such phenomenon also exists in some other countries with the traditional mode of life (for example, in India)

[6,10,16,17]. Higher rates of SPH in men-residents of Moscow are possibly resulted from advantages of living in the capital as against other regions of the Russian Federation: higher living standards, developed health care system, more opportunities for healthy lifestyle [18].

Table 1 presents the one-way ANOVA test results, which characterize social and psychological environment in the groups of men with different SPH. Inter-group statistically significant distinctions were found out in almost all examined parameters presented in table 1. At that the values of majority of the indices were increased with increment in SPH. It should be particularly noted that the SPH status was strongly correlated with the material wealth of a family and satisfaction with salary. We have revealed no associations between the SPH index and such factors as the length of working-day, presence of any hobby, belief in God and the size of living space. However, despite absence of distinctions in the size of living space between the SPH groups, satisfaction with housing conditions was higher in the group of men with good health possibly due to dwelling quality and a number of residents.

Analysis of parameters, characterized social and psychological environment of 41-44-year-old men, has also demonstrated that increase in the SPH score was associated with higher education level, higher professional and social status, favorable working conditions and satisfaction with inter-relations with close persons and social surrounding (table 1). The received results have also shown that SPH correlated with conditions and parameters of vital activity – satisfaction with life in general and its components (living conditions, ecology, functioning of authorities, safety of being, spiritual needs, availability of necessary and various

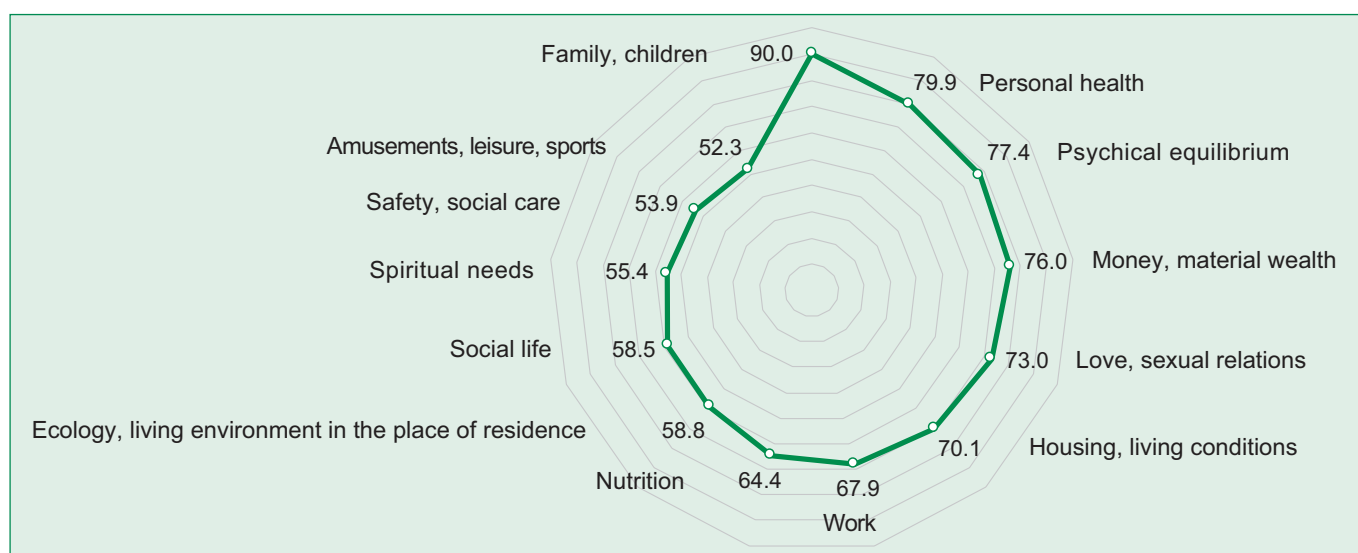


Figure 1. Distribution of the indices of the quality and mode of life in accordance with their significance in the sample of 41-44-year-old men

Table 1. Mean values of the studied indices in the groups of men with different self-perceived health

Indices	Self-perceived health			Spearman's correlation	F-test
	1 (n=106)	2 (n=82)	3 (n=109)		
Age, years	43.0 (42.9-43.1)	42.9 (42.8-43.0)	42.9 (42.8-43.0)	$r_s=-0.069$ $p=0.234$	$F=0.97$ $p=0.380$
Satisfaction with a public position	53.8 (49.7-57.8)	63.5** (59.0-68.1)	71.3**** (68.0-74.6)	$r_s=0.347$ $p<0.001$	$F=21.54$ $p<0.001$
Occupation	3.3 (3.1-3.5)	3.4 (3.3-3.6)	3.6* (3.5-3.8)	$r_s=0.161$ $p=0.006$	$F=4.33$ $p=0.014$
Working conditions	58.0 (53.3-62.7)	62.4 (57.1-67.7)	69.3**** (65.4-73.3)	$r_s=0.238$ $p<0.001$	$F=6.58$ $p=0.002$
Length of working day, hours	8.7 (7.9-9.6)	8.6 (7.9-9.3)	8.5 (7.9-9.2)	$r_s=-0.063$ $p=0.293$	$F=0.098$ $p=0.907$
Relationship with management	68.2 (63.8-72.5)	74.4* (70.2-78.6)	80.8**** (77.4-84.2)	$r_s=0.298$ $p<0.001$	$F=10.55$ $p<0.001$
Relationship with colleagues	73.5 (70.0-76.9)	79.7** (76.4-83.1)	85.3*** (82.9-87.6)	$r_s=0.327$ $p<0.001$	$F=15.95$ $p<0.001$
Satisfaction with own work	57.7 (53.3-62.03)	66.4** (61.9-70.9)	76.8**** (73.7-80.0)	$r_s=0.369$ $p<0.001$	$F=24.88$ $p<0.001$
Absence of nervous stress at work	46.5 (41.7-51.3)	48.7 (43.9-53.5)	59.1**** (54.8-63.3)	$r_s=0.211$ $p<0.001$	$F=8.93$ $p<0.001$
Spiritual needs	49.5 (45.0-53.9)	53.7 (49.5-57.9)	58.7** (54.8-62.5)	$r_s=0.150$ $p=0.009$	$F=5.16$ $p=0.006$
Hobby (occupation for the soul)	53.2 (48.1-58.3)	55.4 (50.1-60.7)	59.9 (54.3-65.4)	$r_s=0.071$ $p=0.221$	$F=1.71$ $p=0.182$
Level of personal happiness	57.4 (53.7-61.0)	71.6*** (68.55-74.7)	77.7**** (74.99-80.4)	$r_s=0.423$ $p<0.001$	$F=44.87$ $p<0.001$
Belief in God	54.6 (48.7-60.5)	62.4 (55.7-69.1)	57.1 (50.8-63.4)	$r_s=0.071$ $p=0.222$	$F=1.45$ $p=0.237$
Sufficient number of friends	56.7 (51.4-61.9)	68.8** (63.8-73.7)	77.6**** (73.2-82.0)	$r_s=0.346$ $p<0.001$	$F=19.72$ $p<0.001$
Satisfaction with communication with friends	61.5 (56.2-66.8)	69.9* (64.9-75.0)	78.4**** (74.3-82.5)	$r_s=0.278$ $p<0.001$	$F=13.17$ $p<0.001$
Support by family and relatives	76.6 (71.4-81.7)	89.6*** (86.2-92.9)	94.2*** (92.4-96.0)	$r_s=0.318$ $p<0.001$	$F=24.90$ $p<0.001$
Support by friends	60.9 (55.2-66.7)	66.9 (61.3-72.5)	78.7**** (74.0-83.3)	$r_s=0.288$ $p<0.001$	$F=12.22$ $p<0.001$
Satisfaction with the work of the authorities	40.4 (35.7-45.0)	48.5* (43.3-53.7)	51.4** (46.7-56.2)	$r_s=0.205$ $p<0.001$	$F=5.85$ $p=0.003$
Availability of necessary products	70.9 (66.8-75.1)	75.4 (71.6-79.2)	82.4**** (79.0-85.7)	$r_s=0.127$ $p=0.029$	$F=9.81$ $p<0.001$
Safety of being	55.9 (52.2-59.7)	64.6** (60.8-68.4)	68.7*** (65.9-72.3)	$r_s=0.314$ $p<0.001$	$F=2.86$ $p<0.001$
Living space, m2	68.8 (55.9-81.8)	72.1 (60.5-83.8)	70.5 (61.2-79.8)	$r_s=0.082$ $p=0.180$	$F=0.08$ $p=0.925$
Education	3.0 (2.8-3.2)	3.5** (3.3-3.7)	3.3* (3.1-3.5)	$r_s=0.114$ $p=0.050$	$F=5.25$ $p=0.006$
Material wealth of family	54.6 (51.3-57.9)	61.3** (57.5-65.2)	66.0*** (62.6-69.4)	$r_s=0.238$ $p<0.001$	$F=11.46$ $p<0.001$
Satisfaction with earnings	42.8 (37.9-47.6)	59.8*** (54.4-64.8)	60.5*** (56.3-64.7)	$r_s=0.269$ $p<0.001$	$F=18.26$ $p<0.001$

Table 1. Mean values of the studied indices in the groups of men with different self-perceived health (continuation)

Indices	Self-perceived health			Spearman's correlation	F-test
	1 (n=106)	2 (n=82)	3 (n=109)		
Satisfaction with housing conditions	59.3 (54.3-64.4)	65.3 (59.9-70.8)	69.6** (65.1-74.2)	$r_s=0.184$ $p=0.002$	$F=4.67$ $p=0.010$
Satisfaction with ecological conditions	52.2 (47.3-57.0)	58.5 (53.8-63.2)	65.6***† (61.6-69.5)	$r_s=0.225$ $p<0.001$	$F=9.41$ $p<0.001$
Satisfaction with conditions of life	66.4 (62.4-70.4)	72.4* (68.6-76.2)	76.5*** (73.1-80.0)	$r_s=0.173$ $p=0.003$	$F=7.76$ $p=0.001$
Variety of food	62.5 (58.8-66.2)	68.23* (64.2-72.3)	72.8*** (69.5-76.2)	$r_s=0.194$ $p=0.001$	$F=8.42$ $p<0.001$
Satisfaction with amount of food	79.9 (76.0-83.7)	88.1*** (85.0-91.1)	91.7*** (89.5-94.0)	$r_s=0.217$ $p<0.001$	$F=16.13$ $p<0.001$
Problems with intimate life	65.9 (60.9-70.9)	75.4** (71.1-79.7)	83.2***† (79.8-86.5)	$r_s=0.342$ $p<0.001$	$F=17.42$ $p<0.001$
Satisfaction with sleep	57.2 (51.9-62.6)	61.7*** (56.4-67.0)	76.8††† (73.1-80.5)	$r_s=0.315$ $p<0.001$	$F=19.47$ $p<0.001$
Level of family happiness	67.7 (62.8-72.5)	78.1** (74.4-82.0)	83.0*** (79.2-86.8)	$r_s=0.293$ $p<0.001$	$F=14.50$ $p<0.001$

Data are presented as M (95% confidence interval)

* $p<0,05$; ** $p<0,01$; *** $p<0,001$ as compared to the group 1

† $p<0,05$; †† $p<0,01$; ††† $p<0,001$ as compared to the group 2

1 – bad health; 2 – satisfactory health; 3 – good health

food products, sleep and intimacy). Presence of the linear relationship (from weak to moderate) between SPH and the examined indices was verified by the statistically high significant Spearman's rank correlation coefficients.

So, majority of factors which characterize social and psychological environment in middle-aged men determine perception of their personal health.

In accordance with our data material wealth, educational status, affiliation with a higher professional group, satisfaction with work, social status, social contacts and assistance and also safe living conditions can influence HSP; this is supported by a number of other scientific publications [6,16,19-21]. Moreover, significant social connections and high level of social assistance are associated with lower morbidity rates and increased life expectancy [22]. Positive correlation of educational status with the SPH score in our study testifies that different level of education and respectively different level of knowledge about diseases, symptoms, methods and opportunities of treatment can influence not only health status but also different self-assessment of health. People with high education are as a rule more attentive to their health, promote it's improving and abstain of factors which can ravage it [20,23].

Based on dependence of SPH on family material wealth we have excluded influence of this factor on intergroup distinctions in the studied indices (table 2). However, adjustment for differences in family material wealth has not impact the earlier revealed intergroup distinctions except for satisfaction with housing conditions and spiritual needs. This can be possibly explained by the fact that both decent housing fit-out and satisfaction of spiritual needs (visits to cultural institutions, amusements, travels) are sometimes associated with severe material costs which not everybody can afford. In this aspect our data do not accord with other similar trials data, possibly due to insufficient number of observations and gender particularities of the examined subjects; further research is required in this area [24-26].

So, middle-aged men revealed positive associations between the SPH score and majority of characteristics of the life quality and mode which were independent on their family material well-being.

Results of the one-way analysis of variance, listed in table 3, indicate on distinctions between the groups with different SPH in such parameters as: systolic BP (SBP), handgrip test, alcohol consumption, the levels of stress, vital exhaustion and physical activity, as well

Table 2. Mean values of the studied indices after adjustment for the material wealth of a family in the groups of men with different self-perceived health

Indices	Self-perceived health			F-test
	1 (n=106)	2 (n=82)	3 (n=109)	
Education	3.1 (2.9-3.3)	3.5** (3.26-3.7)	3.2 (3.0-3.4)	F=4.64 p<0.001
Occupation	3.4 (3.2-3.5)	3.4 (3.3-3.6)	3.6* (3.4-3.8)	F=5.46 p<0.001
Satisfaction with working conditions	59.9 (55.2-64.7)	62.1 (57.6-66.9)	68.2* (63.9-72.6)	F=5.72 p<0.001
Satisfaction with own work	60.6 (56.8-64.4)	66.0* (62.1-69.9)	74.9****+ (71.4-78.4)	F=21.63 p<0.001
Absence of nervous stress at work	44.7 (39.9-49.5)	48.8 (43.8-53.7)	58.9****+ (54.5-63.3)	F=4.68 p<0.001
Length of working day, hours	9.0 (8.3-9.8)	8.6 (7.8-9.4)	8.7 (8.0-9.4)	F=1.30 p=0.264
Relationship with management	69.6 (65.5-73.8)	74.3 (70.2-78.4)	79.5*** (75.8-83.3)	F=7.34 p<0.001
Relationship with colleagues	74.4 (71.3-77.5)	79.6* (76.4-82.8)	84.4****+ (81.5-87.3)	F=8.79 p<0.001
Satisfaction with housing conditions	62.2 (57.6-66.7)	64.8 (58.9-69.7)	66.3 (61.8-70.8)	F=15.6 p<0.001
Satisfaction with earnings	48.3 (44.7-51.8)	59.0*** (55.17-62.78)	55.7** (52.2-59.1)	F=62.17 p<0.001
Variety of food	64.2 (60.7-67.8)	67.9 (64.1-71.8)	71.2** (67.8-74.7)	F=10.44 p<0.001
Satisfaction with amount of food	81.3 (78.2-84.3)	87.8** (84.5-91.1)	91.9*** (88.9-94.9)	F=11.46 p<0.001
Availability of necessary products	73.1 (69.4-76.7)	75.2 (71.2-79.1)	81.6***+ (78.0-85.2)	F=9.95 p<0.001
Problems with intimate life	68.1 (63.8-72.3)	75.3* (70.8-79.9)	83.4****+ (79.2-87.6)	F=9.47 p<0.001
Satisfaction with sleep	56.4 (51.5-61.2)	61.7 (56.5-66.8)	75.6***+++ (70.9-80.3)	F=8.76 p<0.001
Satisfaction with a public position	57.0 (53.5-60.5)	63.1* (59.4-66.9)	69.0****+ (65.6-72.4)	F=28.17 p<0.001
Satisfaction of spiritual needs	51.7 (47.6-55.8)	53.5 (49.1-57.9)	56.9 (52.9-60.9)	F=7.58 p<0.001
Hobby (occupation for the soul)	54.6 (49.2-60.0)	55.32 (49.5-61.2)	59.44 (52.9-60.9)	F=1.24 p=0.292
Level of personal happiness	60.8 (57.8-63.8)	71.3*** (68.1-74.6)	77.1****+ (74.2-80.0)	F=31.87 p<0.001
Level of family happiness	70.2 (65.9-74.6)	77.9* (73.5-82.3)	83.2*** (79.4-87.1)	F=8.89 p<0.001
Belief in God	55.8 (49.4-62.2)	62.4 (55.6-69.9)	57.7 (51.4-63.9)	F=0.95 p=0.447
Sufficient number of friends	60.1 (55.3-65.0)	68.7* (63.5-73.9)	76.8****+ (72.1-81.4)	F=12.45 p<0.001

Table 2. Mean values of the studied indices after adjustment for the material wealth of a family in the groups of men with different self-perceived health (continuation)

Indices	Self-perceived health			F-test
	1 (n=106)	2 (n=82)	3 (n=109)	
Satisfaction with communication with friends	63.8 (58.9-68.6)	69.9 (64.8-75.0)	77.2***† (72.5-81.9)	F=7.77 p<0.001
Support by friends	63.3 (58.1-68.5)	66.8 (61.2-72.4)	75.7**† (70.6-80.9)	F=9.56 p<0.001
Support by family and relatives	78.0 (74.2-81.8)	89.6*** (85.5-93.7)	93.9*** (90.2-97.7)	F=11.09 p<0.001
Satisfaction with the work of the authorities	40.5 (35.6-45.4)	48.4* (43.0-53.7)	50.4** (45.6-55.2)	F=3.19 p=0.001
Safety of being	56.0 (52.3-59.8)	64.5** (60.4-68.5)	68.12*** (64.5-71.8)	F=6.45 p<0.001
Satisfaction with ecological conditions	54.5 (50.1-58.9)	58.3 (53.5-63.1)	64.0** (59.7-68.3)	F=8.32 p<0.001
Satisfaction with conditions of life	67.9 (67.2-71.7)	72.1 (68.1-76.1)	75.7** (72.1-79.3)	F=7.56 p<0.001

Data are presented as M (95% confidence interval)

*p<0,05; **p<0,01; ***p<0,001 as compared to the group 1

†p<0,05; ††p<0,01; †††p<0,001 as compared to the group 2

1 – bad health; 2 – satisfactory health; 3 – good health

as on trends to differences in diastolic BP (DBP), heart rate, the WC/HC ratio. Further post hoc comparisons (table 3) have found out that men with bad health (first group) as compared with their peers with good health (third group) revealed higher measurements of SBP, DBP and the abdominal obesity index (WC/HC ratio) while the index of handgrip test was lower. Men of the first group had also consumed more alcohol, more often smoked, had less physical activity and higher levels of stress and vital exhaustion. We have found no statistically significant distinctions between the groups in the body mass index (Quetelet index) and lipid profile parameters.

Thus, majority of the risk factors for chronic non-infectious diseases such as: increased BP, abdominal obesity, excess alcohol consumption, psychosocial stress, vital exhaustion and low physical activity determine bad SPH in men of middle age.

In contrast to some studies conducted in Germany, Canada, Russia, Great Britain and others, which reported the direct correlation of smoking with low SPH, we have only found a trend to such association [6]. One can suppose that smoking is a way of "struggle" with stress which often displaces such wholesome practices as physical culture and sports and negatively impacts SPH. For example, in accordance with the Rosstat data (2008) 24.5% of respondents had answered that "smoking calms" on the question of rea-

sons for smoking [6]. Association of physical activity with the SPH index, revealed in our study, had been also proved by other trials data [27]. The linear correlation (from weak to moderate) between SPH and cardiovascular risk markers (SBP, WC/HC ratio, amount of ethanol consumed, stress, life exhaustion and physical activity) was affirmed by the statistically significant Spearman's correlation coefficients. A similar association of SPH with BP level was reported by V.S. Kaveshnikov [10]. Association of excess alcohol consumption with low SPH has been affirmed by a large body of home and foreign studies [28].

Our study has demonstrated high level of stress and severe vital exhaustion to be associated with bad SPH in middle-aged men. A similar association was revealed in studies conducted by G. Macassa et al. and I.V. Gagulina et al. [29,30]. People in a stressful situation have health problems almost twice as frequently, as this population group is more prone to refuse from healthy mode of life (unhealthy diet, sleep disturbance, low physical activity, smoking, excess alcohol consumption and so on) [16,19]. In case of vital exhaustion other authors have also noted that men with high level of vital exhaustion experience severe stress both at the workplace and at home, increase smoking intensity, restrict their physical activity and do not change dietary habits, which obviously influence their HSP [29].

Table 3. Mean values of the cardiovascular risk markers in the groups of men with different self-perceived health

Indices	Self-perceived health			Spearman's correlation	F-test
	1 (n=106) M (95%CI)	2 (n=82) M (95%CI)	3 (n=109) M (95%CI)		
Age, years	43.0 (42.9-43.1)	42.9 (42.8-43.0)	42.9 (42.8-43.0)	$r_s=-0.069$ $p=0.234$	$F=0.97$ $p=0.380$
SBP, mm Hg	125 (122-128)	121 (118-124)	120* (118-123)	$r_s=-0.113$ $p=0.052$	$F=3.24$ $p=0.040$
DBP, mm Hg	84 (82-86)	82 (80-85)	81** (79-83)	$r_s=-0.110$ $p=0.060$	$F=2.69$ $p=0.069$
Heart rate, beats per minute	76 (74-78)	73* (71-75)	74 (72-75)	$r_s=-0.126$ $p=0.030$	$F=2.67$ $p=0.071$
BMI, kg/m ²	27.9 (26.8-28.9)	27.7 (26.16-28.8)	27.4 (26.6-28.2)	$r_s=-0.025$ $p=0.666$	$F=0.24$ $p=0.784$
WC, cm	95.9 (93.1-98.7)	95.0 (92.1-97.9)	92.6 (90.3-94.8)	$r_s=-0.100$ $p=0.086$	$F=1.85$ $p=0.160$
WC/HC	0.94 (0.93-0.96)	0.93 (0.91-0.95)	0.91* (0.9-0.93)	$r_s=-0.137$ $p=0.019$	$F=2.93$ $p=0.054$
Handgrip test, kg	41.9 (40.4-43.5)	43.1 (41.4-44.7)	44.9** (43.4-46.3)	$r_s=0.152$ $p=0.009$	$F=3.95$ $p=0.020$
TC, mmol/l	5.8 (5.54-6.1)	5.7 (5.48-5.95)	5.6 (5.43-5.87)	$r_s=-0.033$ $p=0.57$	$F=0.52$ $p=0.597$
HDL-C, mmol/l	0.99 (0.26-1.05)	1.011 (0.928-1.094)	1.006 (0.951-1.062)	$r_s=0.05$ $p=0.39$	$F=0.12$ $p=0.890$
LDL-C, mmol/l	4.11 (3.86-4.36)	4.084 (3.85-4.31)	4.030 (3.82-4.24)	$r_s=-0.005$ $p=0.93$	$F=0.14$ $p=0.872$
TG, mmol/l	1.58 (1.36-1.8)	1.37 (1.2-1.52)	1.34 (1.19-1.5)	$r_s=-0.071$ $p=0.220$	$F=2.08$ $p=0.126$
Number of cigarettes per day	18.4 (15.6-21.1)	17.7 (14.3-21.1)	14.2* (11.8-16.7)	$r_s=-0.182$ $p=0.41$	$F=2.63$ $p=0.076$
Amount of consumed ethanol, g/month	1093.6 (770.0-1417.2)	529.2** (373.1-685.2)	447.0*** (333.3-560.6)	$r_s=-0.189$ $p=0.003$	$F=10.18$ $p<0.001$
Psychosocial stress index	2.7 (2.6-2.8)	2.8 (2.7-3.0)	3.1***+++ (3.0-3.2)	$r_s=0.295$ $p<0.001$	$F=15.24$ $p<0.001$
VE index	6.3 (5.6-7.0)	4.6*** (3.9-5.3)	2.5***+++ (2.2-2.9)	$r_s=-0.489$ $p<0.001$	$F=44.38$ $p<0.001$
Sports activities at leisure, hours/week	1.5 (1.1-1.9)	2.0 (1.4-2.6)	2.7** (2.1-3.3)	$r_s=0.169$ $p=0.003$	$F=4.94$ $p=0.008$

* $p<0,05$; ** $p<0,01$; *** $p<0,001$ as compared to the group 1
† $p<0,05$; †† $p<0,01$; ††† $p<0,001$ as compared to the group 2
1 – bad health; 2 – satisfactory health; 3 – good health
SBP – systolic blood pressure, DBP – diastolic blood pressure, BMI – body mass index, WC – waist circumference, HC – hip circumference, TC – total cholesterol,
HDL-C – high-density lipoprotein cholesterol, LDL-C – low-density lipoprotein cholesterol, TG – triglycerides, VE – vital exhaustion, CI – confidence interval

After adjustment of intergroup distinctions for family wealth (table 4) differences in SBP level and the WC/HC ratio have disappeared ($F=1.84$; $p=0.106$ and $F=1.39$; $p=0.228$, respectively) while statistically sig-

nificant differences in heart rate and TC level have been fixed ($F=3.13$; $p=0.009$ and $F=-2.48$; $p=0.031$, respectively). Changes in heart rate and total cholesterol level are not directly related to material well-being, but

Table 4. Mean values of the cardiovascular risk markers after correction for the material wealth of a family in the groups of men with different self-perceived health

Indices	Self-perceived health			F-test
	1 (n=106) M (95%CI)	2 (n=82) M (95%CI)	3 (n=109) M (95%CI)	
SBP, mm Hg	126 (123-129)	121 (118-125)	121 (118-123)	F=1.84 p=0.106
DBP, mm Hg	85 (83-87)	82 (80-84)	81* (79-83)	F=2.06 p=0.071
Heart rate, beats per minute	76 (74-78)	73* (71-75)	74 (73-76)	F=3.13 p=0.009
BMI, kg/m ²	28.0 (27.1-29.0)	27.7 (26.6-28.7)	27.4 (26.5-28.4)	F=0.95 p=0.451
WC, cm	96.3 (93.6-99.0)	94.9 (92.0-97.8)	92.6 (90.0-95.3)	F=1.25 p=0.284
WC/HC	0.95 (0.93-0.96)	0.93 (0.92-0.95)	0.92 (0.90-0.93)	F=1.39 p=0.228
Handgrip test, kg	43.4 (40.8-43.9)	43.0 (41.4-44.7)	45.0* (43.5-46.5)	F=2.62 p=0.025
TC, mmol/l	5.9 (5.7-6.2)	5.7 (5.5-6.0)	5.6* (5.3-5.8)	F=2.48 p=0.032
HDL-C, mmol/l	0.97 (0.91-1.04)	1.02 (0.94-1.09)	1.01 (0.95-1.08)	F=2.13 p=0.063
LDL-C, mmol/l	4.2 (4.0-4.4)	4.1 (3.8-4.3)	4.0 (3.7-4.2)	F=2.24 p=0.50
TG, mmol/l	1.6 (1.4-1.8)	1.4 (1.2-1.6)	1.3 (1.2-1.5)	F=1.58 p=0.166
Number of cigarettes per day	19 (16-21)	18 (15-21)	15 (12-17)	F=1.88 p=0.103
Amount of consumed ethanol, g/month	1055.8 (832.3-1279.3)	520.2** (271.7-768.7)	458.0*** (239.1-676.9)	F=4.81 p<0.001
Psychosocial stress index	2.7 (2.6-2.8)	2.9 (2.7-3.0)	3.1**** (3.0-3.2)	F=7.13 p<0.001
VE index	6.0 (5.5-6.6)	4.6** (4.0-5.2)	2.6**** (2.0-3.2)	F=22.22 p<0.001
Sports activities at leisure time, hours/week	1.5 (1.0-2.1)	2.0 (1.4-2.6)	2.6** (2.1-3.2)	F=2.65 p=0.023

*p<0,05; **p<0,01; ***p<0,001 as compared to the group 1
†p<0,05; ††p<0,01; †††p<0,001 as compared to the group 2
1 – bad health; 2 – satisfactory health; 3 – good health
SBP – systolic blood pressure, DBP – diastolic blood pressure, BMI – body mass index, WC – waist circumference, HC – heaps circumference, TC – total cholesterol, HDL-C – high-density

are due to other factors not considered in this study. The total F-test demonstrated this model to be also statistically significant for the handgrip test (F=2.62; p=0.025), amount of ethanol consumed (F=4.81; p=0.0003), levels of stress (F=7.13; p=0.0001), vital exhaustion (F=22.22; p<0,001) and leisure physical activity (F=2.65; p=0.023). Reduction in heart rate,

increase in flexor force of the hand, decrease in TC level, revealed at the post hoc comparisons, positively influenced the general health of men and respectively increase its self-perception.

So, material well-being impacts the levels of such CVD risk markers as SBP, the WC/HC ratio, a number of cigarettes per day and respectively the SPH index.

Table 5. Multiple regression analysis results for the independent variables associated with self-perceived health in the middle-aged men

Independent variables	Dependent variable: health status in accordance with self-perception		
	B (95%CI)	p	b
Constant	13.74(0.15; 23.33)	0.048	0
Level of personal happiness	0.42(0.28; 0.56)	<0.001	0.45
Nervous stress at work	0.18(0.10; 0.27)	<0.001	0.26
Support by family and relatives	0.17(0.06; 0.27)	0.002	0.21
Sports activities	1.10(0.41; 1.79)	0.002	0.19
Working conditions	0.12(0.03; 0.20)	0.007	0.17
Hobby (occupation for the soul)	-0.12(-0.20; -0.03)	0.006	-0.18
TC, mmol/l	-1.83(-3.45; -0.22)	0.027	-0.14
Satisfaction with own work	0.12(0.01; 0.22)	0.027	0.16
R ² (corrected)		0.535	
B – regression coefficient, CI – confidence interval, b (beta) – standardized regression coefficient, TC – total cholesterol			

In accordance with the multiple regression analysis results (table 5) the level of personal happiness, nervous stress at work, family and relatives support, physical activity, working conditions, hobby, TC level and satisfaction with work were the independent determinates of health status (by self-perception) and explained 53.5% of its variability. Health status inversely correlated with a hobby presence and blood TC level. Negative association of hobby with SPH can be mainly explained by insufficient family income.

So, the regression analysis demonstrated that the most significant determinants of SPH in middle-aged men were the level of personal happiness, lack of nervous stress at work, family support, physical activity, working conditions, TC level and satisfaction with own work.

Conclusion

Assessment of association between self-perceived health and such factors as social and psychological environment, the mode of life and the markers of cardiovascular risk in middle-aged men has revealed that ma-

jority of factors which characterize psychosocial environment in men of middle age are to any extent related to self-perception of health and independent of material wealth with the exception for satisfaction with housing and spiritual needs. Material well-being impacts SBP level, the WC/HC ratio, a number of cigarettes per day and respectively the SPH index. Increased BP, abdominal obesity, excess alcohol consumption, psychosocial stress, vital exhaustion and low physical activity determine low SPH. The principal determinants of SPH in middle-aged man are the level of personal happiness, nervous stress at work, family support, physical activity, working conditions, TC level and satisfaction with own work. When working on programs focused on public health improvement the social, psychological and behavioral determinants of self-perceived health must be considered.

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