

Quality of life, fatness and selected health parameters in adult Polish population of 50–90 years of age

Antonina G. Kaczorowska¹, Slawomir Koziel², Anna Sebastjan³, Aleksandra Katan¹, Zofia Ignasiak⁴

¹Institute of Health Sciences, University of Opole, Poland

²Department of Anthropology, Hirsztfeld Institute of Immunology and Experimental Therapy, Polish Academy of Sciences, Wrocław, Poland

³Faculty of Physical Education and Sport, Wrocław University of Health and Sport Sciences, Wrocław, Poland

⁴Department of Preclinical Sciences, Pharmacology and Medical Diagnostics, Faculty of Medicine, Wrocław University of Science and Technology, Wrocław, Poland

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Abstract

Introduction: Healthy aging is expected to have an impact on quality of life.

Aim of the research: This study aims to assess the quality of life of Polish adults aged 50–90 years and its associations with body fatness and selected health parameters.

Material and methods: There were 1,553 people aged 50–90 examined. The Polish version of the World Health Organisation Quality of Life short questionnaire (WHOQoL-BREF) was used to assess quality of life. Bone mineral density, forced vital capacity and forced expiratory volume in 1 second were measured. Height, body weight, waist and hip circumferences were measured. The body mass index (BMI) and the waist-hip ratio (WHR) were calculated.

Results: Men rate their quality of life more positively than women in the somatic, psychological and environmental domains. The somatic domain shows significant associations with body dimensions, and body fat distribution as measured by the WHR index. Further independent variables showing associations with this domain are T-ratio% and Z-ratio%, forced expiratory volume in 1 second, gender and education level. The social domain is significantly influenced by WHR and forced vital lung capacity. However, the environmental domain of quality of life remains significantly influenced by the higher level of education of the respondent. Good and very good health was declared by respondents with a lower BMI and a lower percentage of body fat, both in the group of men and women.

Conclusions: Normal body weight and body fat distribution, as well as higher bone density and better respiratory function are conducive to a better quality of life.

Introduction

Healthy aging is one of the key goals of gerontology and geriatrics in the 21st century. Gerontology deals not only with diseases, frailty and death, but also with patients' hopes for maintaining health and good functioning and optimising their well-being [1]. Healthy aging is expected to have an impact on quality of life. Therefore, understanding the level of quality of life and its determinants in the perspective of healthy aging is of paramount importance [2]. Optimal quality of life of older adults is closely linked to functioning in the living environment, and its maintenance is necessary in the era of demographic changes, which result in an increase in the average life expectancy and the proportion of older adults in society [3]. In Poland, there is currently a significant increase in the percentage of older adults over 60 years of age, and an even greater increase in the percentage of people over 80 years of age, which is called the phenomenon

of “double aging” [4]. From the perspective of society, it is important to assess the health status and quality of life of older adults, not only those suffering from chronic diseases, but also those who are healthy. Age, as a non-modifiable factor, increases the risk of many diseases. For this reason, the percentage of healthy people decreases with age, which is also associated with a lower sense of health and quality of life [5].

The SHARE study, covering 17 European countries, showed the greatest inequalities in the health of the older population. In the social democratic countries (Sweden, Denmark), the largest percentage of the surveyed people (76.40%) assessed their health as good. In the Bismarck countries (Germany, France, Switzerland, Austria, Luxembourg, Belgium), this percentage was 68.61%, in the countries of Southern Europe (Greece, Italy, Portugal, Spain) 59.51%, and in the countries of Eastern Europe (Croatia, Czech Republic, Estonia, Poland, Slovenia) only 46.62% [6]. Poland, classified as an Eastern European country, belongs

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to the post-communist countries. Seniors from these countries were less likely to follow a healthy lifestyle and treated their health worse compared to their peers from Western Europe [7]. The SHARE study shows that more than half of the Eastern Europeans surveyed assessed their health as poor. There are also large gender inequalities in the health of the older population in Eastern European countries. Men aged 60 to 79 and women over 80 from Eastern European countries reported poorer health [6]. In Polish studies, there are ambiguous results regarding the self-assessment of health and quality of life of older men and women. Some studies show that Polish older women assess their quality of life lower compared to men [8, 9]. Other authors have shown that the assessment of the quality of life and health of older men and women is similar [10].

Age 50+ is a period of late adulthood in which distinct involution processes occur, affecting health and biological condition [11]. Research on quality of life in adults and older adults most often focuses on health factors such as the presence of various diseases [10, 12], obesity [13], smoking and alcohol drinking [2], physical fitness [14] and socioeconomic factors [15]. Far fewer studies address the associations of quality of life with specific health parameters such as body composition, body fatness, respiratory function or bone mineral density.

Aim of the research

This study aims to assess the quality of life of Polish men and women aged 50–90 years and its associations with body fatness and selected health parameters.

Material and methods

Ethical statement

The Commission for Ethics of Scientific Research of the University of Health and Sport Sciences in Wrocław gave its consent to the study (2009, amended in 2015). The study was conducted in accordance with the ethical requirements for experiments on humans in accordance with the Helsinki Declaration. Participants signed voluntary and informed consent to participate in the study. The research was retrospectively registered on the ISRCTN platform (No. 18225729).

Study design and participants

The study was conducted in 2010–2016. The project was financed by the Ministry of Science and Higher Education (project number N404 075337). The subject of the project was the assessment of the biological condition and quality of life of adults and older adults. Participants volunteered for free studies thanks to advertisements in the media and invitations sent to centres associating older people.

The study group included 1,553 people aged 50–90, including 1,171 women and 382 men. Since not all participants had completed measurements, the number of subjects varied according to complete records of particular studied features. However, only participants with complete data were included in multiple analysis. The mean age for women was 64.81 years and for men 66.52 years. Inclusion criteria were 1) age of 50–90 years, 2) ability to move independently, 3) good verbal communication, 4) no medical contraindications, and 5) voluntary written consent to participate in the study. Exclusion criteria were 1) cancer, 2) acute trauma and infection, 3) febrile conditions, 4) recent myocardial infarction, 5) other medical contraindications and 6) lack of consent to participate in the study.

Methods

The Polish version of the World Health Organisation Quality of Life short questionnaire (WHO-QoL-BREF) was used to assess quality of life [16, 17]. The scale consists of 26 questions. Each question can be given 1 to 5 points. The first two questions include a subjective assessment of the overall quality of life and a subjective assessment of health. The next questions are grouped in 4 domains: somatic (7 questions), psychological (6 questions), social (3 questions) and environmental (8 questions). The results of each domain are the sum of points for each question in the domain. The higher the sum of points in each domain, the better the quality of life. The raw scores were transformed according to the 0–100 key to correspond to the results of the WHOQoL-100 scale [18]. The WHOQOL-BREF has been shown to have good or excellent psychometric properties in terms of reliability and performs well in preliminary validity tests [16]. According to Jaracz *et al.*, who measured the validity and reliability of the WHOQoL scale in the Polish population, high validity was found in the range of 0.62–0.76 for the physical domain, 0.55–0.78 for the psychological domain, 0.68–0.85 for the social domain, and 0.58–0.68 for the environmental domain. Acceptable internal consistency was demonstrated with Cronbach's α coefficients [17].

Height was measured to an accuracy of 0.1 cm and body weight to an accuracy of 0.1 kg using electronic scales with an integrated digital stadiometer SECA 764 (Seca GmbH & Co. KG., Germany). The body mass index (BMI) was then calculated. The percentage of body fat (FAT%) was estimated by bioelectrical impedance analysis (BIA) using an 8-electrode multi-frequency analyser TANITA MC 180 MA (certificate 93/42 EEC, manufacturer: Tanita Corporation, Japan). The measurement was performed in a standing position on a platform with built-in four foot electrodes (two electrodes per foot) and two two-electrode holders enabling additional segmental readings separately

for each limb and trunk. BIA measurements were performed in the morning, according to the procedures indicated by the analyser's manufacturer [19]. When registering for the study, participants were asked not to eat, drink or engage in any physical activity for at least 3 hours prior to the test and to empty their bladders immediately prior to measurement. Waist and hip circumferences were measured to the nearest 0.1 cm over clothing (with firm pressure applied) at the level of the umbilicus and greater trochanters, respectively. The waist-hip ratio (WHR) was then calculated.

Bone mineral density (BMD) was measured at the distal epiphysis of the non-dominant limb. Measurements were performed using peripheral dual energy X-ray absorptiometry (pDEXA) with an EXA-3000 bone densitometer. For the purposes of this study, bone mineral density was analysed using ideal % BMD (T-ratio%) and age-matched % BMD (Z-ratio%).

A FlowScreen spirometer (780.578; version 1.3, Jaeger, Würzburg, Germany) was used to measure respiratory function. All procedures were in accordance with the guidelines of the American Thoracic Society [20, 21]. Analysis was performed on the flow–volume loop of forced expiratory flow/volume of exhaled air. After participants were familiarised with the procedures, the following variables were measured: forced vital capacity (FVC) and forced expiratory volume in 1 second (FEV1).

Statistical analysis

The Kolmogorov-Smirnov test was used to check the normality of the distribution. When the test con-

firmed the lack of deviations from the normal distribution, the Student's *t*-test for independent samples was used to estimate the significance of gender differences, and in the case of significant deviations from the normal distribution, the Mann-Whitney *U* test was used. The Pearson chi-square test was used to estimate significant gender differences in the frequencies of individual categories of general quality of life and health. The influence of independent variables on the values of individual quality of life domains was estimated using the Generalised Linear Model with a logit link function, and the significance of the influence of individual variables was tested using the Wald χ^2 test.

Results

Descriptive data

The study groups of men and women differ significantly in terms of age, somatic parameters, body fatness, health parameters and quality of life assessment in the somatic, psychological and environmental domains. Men are older than women and have a higher BMI. They also have a higher WHR and a lower percentage of body fat, as would be expected. T-ratio% and Z-ratio% as well as FVC and FEV1 are higher in the male group than in the female group. Men rate their quality of life more positively than women in the somatic, psychological and environmental domains (Table 1).

The level of education and the general assessment of the quality of life and self-assessment of health did not differ significantly in the study groups (Table 2).

Table 1. Descriptive statistics of the variables used in this study

Parameter	Males			Females			<i>t</i> / <i>Z</i>	<i>P</i> -value
	<i>N</i>	Mean	SD	<i>N</i>	Mean	SD		
Age [years]	382	66.52	7.69	1171	64.81	7.14	4.18*	< 0.001
Height [cm]	382	173.26	6.50	1170	159.03	5.97	39.03	< 0.001
BMI [kg/m ²]	382	28.82	3.60	1159	28.34	4.77	3.08*	< 0.01
WHR	382	0.963	0.071	1156	0.847	0.075	26.44	< 0.001
Fat%	352	24.47	5.22	1080	35.18	5.32	23.79*	< 0.001
T-ratio%	369	89.39	14.12	1127	69.34	16.85	20.61	< 0.001
Z-ratio%	369	108.16	17.54	1132	88.28	21.42	16.14	< 0.001
FVC [cm ³]	374	4.01	0.81	1096	2.81	0.56	22.81*	< 0.001
FEV1/FEV1 [cm ³]	374	3.11	0.68	1096	2.21	0.48	20.91*	< 0.001
Somatic d.	380	73.74	12.82	1159	71.06	12.73	3.53*	< 0.001
Psychological d.	380	65.55	12.74	1159	60.84	13.13	5.78*	< 0.001
Social d.	380	69.45	15.87	1159	67.41	16.87	1.28*	n.s.
Environmental d.	380	67.57	12.04	1159	65.24	12.06	3.13*	< 0.01

SD – standard deviation, BMI – body mass index, WHR – waist–hip ratio, FAT% – % of body mass, T-ratio% – ideal %BMD, Z-ratio% – age-matched %BMD, FVC – forced vital capacity, FEV1/FEV1 – forced expiratory volume in 1 s, *significance was assessed using the nonparametric Mann-Whitney *U* test.

Table 2. Descriptive statistics of the categorical variables used in the study

Parameter	Males = 351		Females = 1095		χ^2 (df)	P-value
	N	%	N	%		
Education level					0.22 (1)	n.s.
College and higher	312	88.89	983	89.77		
Trade/Vocational and basic	39	11.11	112	10.23		
Quality of life					8.30 (4)	n.s.
1	5	1.42	5	0.46		
2	7	1.99	29	2.65		
3	62	17.66	224	20.46		
4	242	68.95	761	69.50		
5	35	9.97	76	6.94		
Health						
1	3	0.85	16	1.46	5.53 (4)	n.s.
2	37	10.54	126	11.51		
3	95	27.07	327	29.86		
4	193	54.99	582	53.15		
5	23	6.55	44	4.02		

Table 3. Results of analysis of covariance, where particular value of domain of quality of life were the dependent variable

Parameter	Somatic domain		Psychological domain		Social domain		Environmental domain		
	χ^2	Wald	<i>P</i> -value	χ^2	Wald	<i>P</i> -value	χ^2	Wald	<i>P</i> -value
Age	1.47		n.s.	0.34		n.s.	0.04		n.s.
Height	4.68		< 0.05	0.04		n.s.	1.33		n.s.
BMI	6.04		< 0.05	2.49		n.s.	0.52		n.s.
WHR	8.96		< 0.01	0.30		n.s.	5.61		< 0.05
Fat%	0.15		n.s.	0.29		n.s.	0.02		n.s.
T-ratio%	6.01		< 0.05	0.28		n.s.	0.13		n.s.
Z-ratio%	7.38		< 0.01	0.54		n.s.	0.24		n.s.
FVC	0.42		n.s.	1.60		n.s.	4.89		< 0.05
FEV1	4.75		< 0.05	0.02		n.s.	0.40		n.s.
Sex	4.08		< 0.05	2.67		n.s.	0.15		n.s.
Education	12.97		< 0.001	0.48		n.s.	0.71		n.s.
							9.11		< 0.01

BMI – body mass index, WHR – waist–hip ratio, FAT% – % of body mass, T-ratio% – ideal %BMD, Z-ratio% – age-matched %BMD, FVC – forced vital capacity, FEV₁/FEV1 – forced expiratory volume in 1 s.

Main results

The results for the analysis of covariance where the particular value of the domain of quality of life was the dependent variable are shown in Table 3. The somatic domain shows significant associations with body dimensions, and body fat distribution as measured by the WHR index. Further independent variables showing associations with this domain are

T-ratio% and Z-ratio%, forced expiratory volume in 1 second, gender and education level. Among the other three quality of life domains, only two showed specific significant associations with the independent variables. The social domain is significantly influenced by WHR and forced vital lung capacity. In contrast, the environmental domain of quality of life is significantly influenced by the respondent's level of education (Table 3, Figures 1–3).

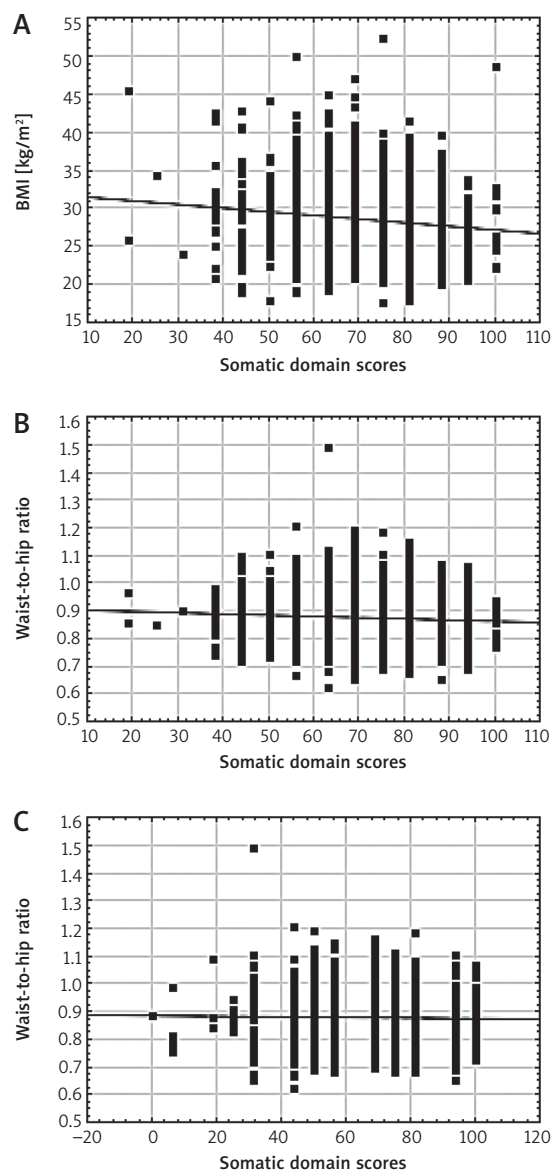


Figure 1. Associations of the somatic and social domains with BMI and WHR

Only self-assessment of health was significantly associated with BMI and body fat percentage (Table 4). Good and very good health was declared by respondents with a lower BMI and a lower percentage of body fat, both in the group of men and women (Figures 4, 5).

Discussion

The quality of life of adults and older adults is an important public health issue that has not yet been thoroughly studied and requires in-depth analysis and explanation. The percentage of older adults in society is constantly increasing. Therefore, it is necessary to maintain a good quality of life for older adults. This study aimed to assess the quality of life of Polish

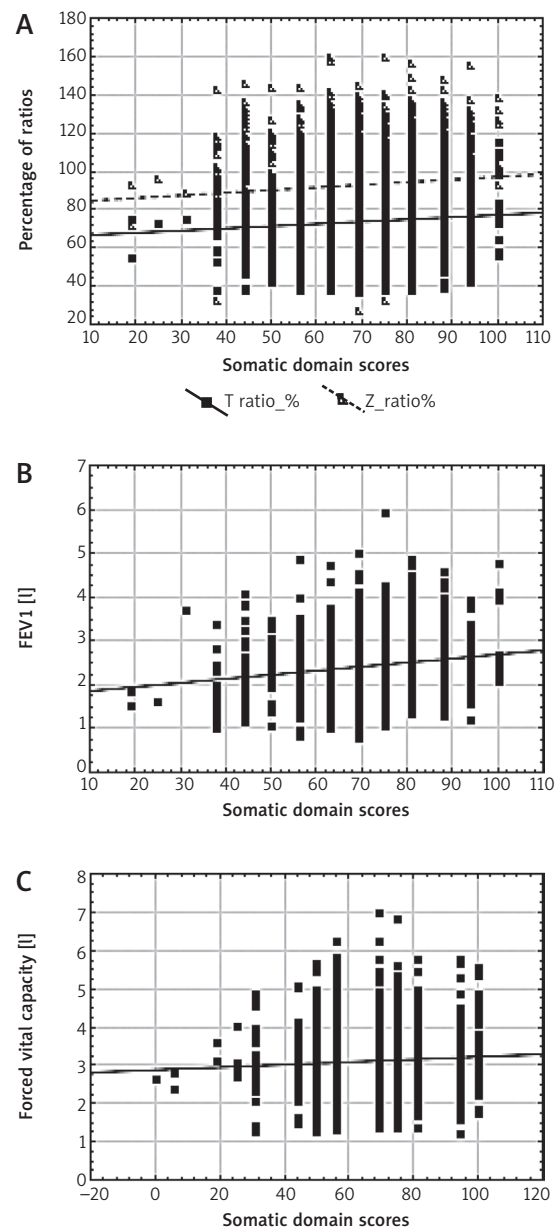


Figure 2. Associations of the somatic and social domains with bone mineral density indices and respiratory function

men and women aged 50–90 years and its associations with body fatness and selected health parameters.

The surveyed people assessed their quality of life and health as good. A high percentage of the surveyed – 78.92% of men and 76.44% of women assessed their overall quality of life as good and very good. On the other hand, 61.54% of men and 57.17% of women assessed their health as good and very good. The surveyed also assessed individual domains of quality of life as good. The highest assessed domain among both men and women was the somatic domain, and the lowest – the psychological domain.

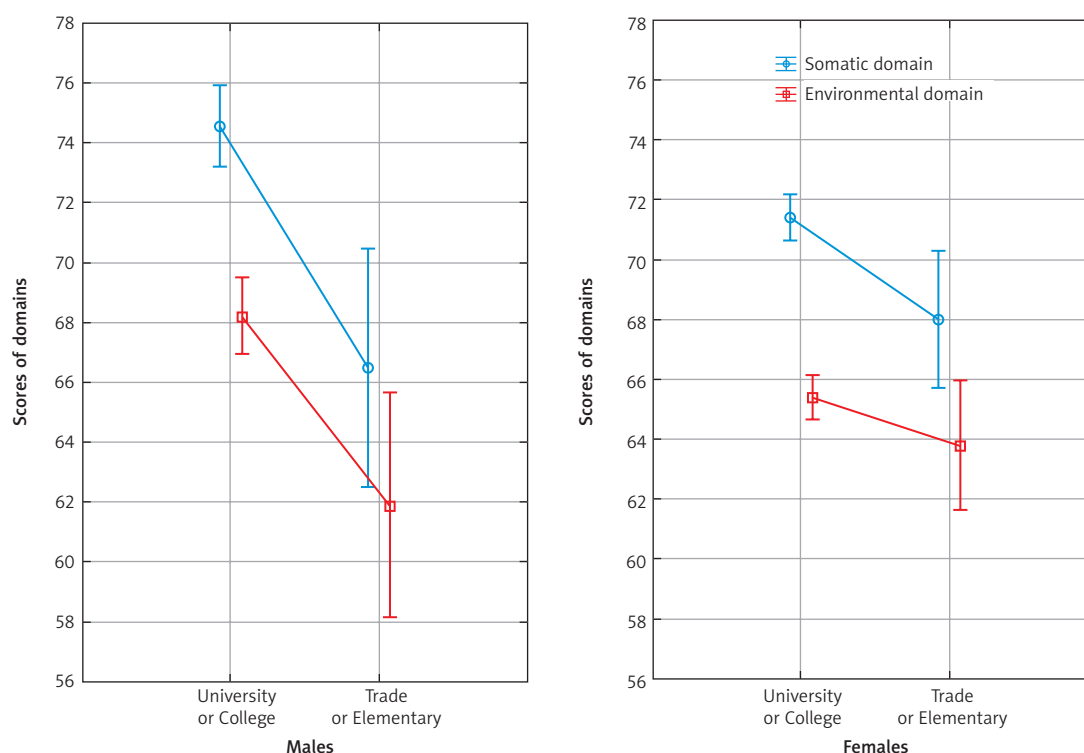


Figure 3. Changes of social and environmental domains' scores by sex and level of education

Table 4. Results of the analysis of covariance where general self-assessment of quality of life and health were dependent variables

Parameter	Quality of life		Health	
	χ^2 Wald	P-value	χ^2 Wald	P-value
Age	8.83	n.s.	6.12	n.s.
Height	4.50	n.s.	7.68	n.s.
BMI	1.93	n.s.	23.66	< 0.001
WHR	3.04	n.s.	6.52	n.s.
Fat%	6.06	n.s.	11.98	< 0.05
T-ratio%	1.41	n.s.	1.42	n.s.
Z-ratio%	2.01	n.s.	2.36	n.s.
FVC	3.91	n.s.	2.66	n.s.
FEV1	3.29	n.s.	4.72	n.s.
Sex	6.16	n.s.	4.56	n.s.
Education	3.19	n.s.	2.50	n.s.

BMI – body mass index, WHR – waist–hip ratio, FAT% – % of body mass, T-ratio% – ideal %BMD, Z-ratio% – age=matched %BMD, FVC – forced vital capacity, FEV1/FEV1 – forced expiratory volume in 1 s.

Such a high self-assessment of health of seniors in our own research is not confirmed by the SHARE study. In Eastern European countries, including Poland, only 46.62% of the surveyed assessed their health as good [6]. The people in our own study came from southwestern Poland. The region of western Poland is

a better developed region compared to eastern Poland in terms of the level of industrialization, road network, urbanization status and education level of residents [22]. This is probably why the adults surveyed achieved such good quality of life results. The lowest quality of life score was obtained by women aged

45–60 from southeastern Poland. The overall quality of life, self-assessment of health and 4 domains were rated as being between 3 and 4 (between “neither poor nor good” and “good”) [23].

The somatic domain showed significant associations with health parameters such as appropriate body weight, body fat distribution, bone mineral density and forced expiratory volume in 1 second. Normal body weight and body fat distribution were associated with higher quality of life in the somatic domain, while obesity promoted lower quality of life scores in this domain. The higher the bone density, measured by Z-ratio% and T-ratio%, and the better the respiratory function, measured by FEV1, the better the subjects' quality of life in the somatic domain. The somatic domain assesses the occurrence of pain, need for medical care, quality of sleep and energy and capacity for daily living. Normal body weight and fat distribution, good bone mineral density and normal respiratory function translate into better physical functioning. Of the other domains, only the social domain showed significant associations with WHR and intensive lung capacity. A lower WHR index and a higher intense vital lung capacity promoted a more favourable quality of life assessment in the social domain. Self-rated health showed significant associations with BMI and fatness. Lower BMI and lower percentage of fatness influenced higher self-rated health.

Few, to date, studies show associations of health parameters with quality of life. The most frequently studied parameter is the BMI index, the increase of which causes a less favourable assessment of the quality of life [10, 24]. A study of Polish older adults found that a high BMI led to a poorer quality of life, especially in the psychological and environmental domains [10]. Another European study confirmed the associations of health parameters with older adult's quality of life as measured by the SF-36 questionnaire. BMI was significantly and negatively associated with the total quality of life score. A higher BMI reduced quality of life. In contrast, the positive association with aerobic endurance was significantly higher for the physical component of quality of life [24].

Excess body weight in older adults is associated with the risk of disability and cardiovascular disease. However, some studies show that BMI, indicative of overweight in older men, is associated with a minimal risk of death [25]. The results of other studies are inconclusive [26]. The use of the BMI classification according to WHO recommendations does not fully work in older adults. BMI measured in older adults is most often overestimated due to decreasing body height. In the older people, enlarged thoracic kyphosis and flattening of the intervertebral discs are so common that they contribute to a significant reduction in an older person's body height. In addition, asymptomatic vertebral fractures may occur in the older adults, especially with frailty syndrome, which also

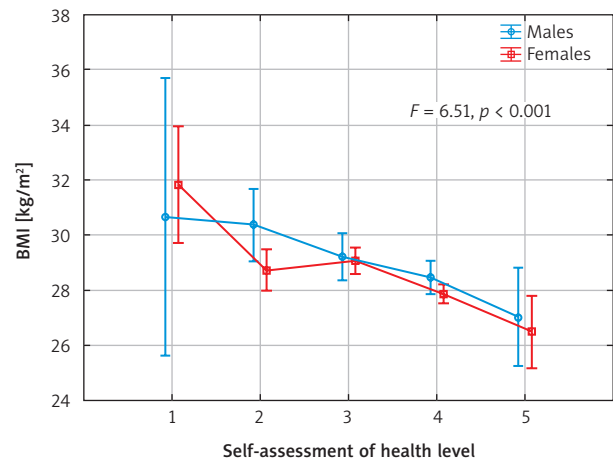


Figure 4. Changes of BMI by categories of self-assessment of health in males and females/men and women

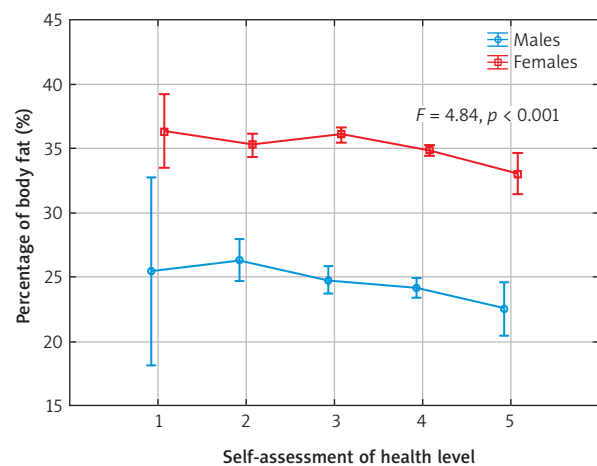


Figure 5. Changes of percentage body fat by categories of self-assessment of health in males and females/men and women

contributes to height reduction. Therefore, elderly underweight individuals may have a normal BMI, and normal-weight individuals may have a BMI indicating overweight [27]. In our study, the highest self-assessment of health and the highest assessment of quality of life in the somatic domain were declared by seniors with an average BMI indicating overweight. A higher BMI was associated with a lower self-assessment of health and a lower assessment of quality of life in the somatic domain. Measuring WHR is another commonly used measurement of body fat. As it measures central obesity, it may be more useful than BMI in assessing body composition levels in older adults [28].

It is worth noting that the somatic and environmental domains were significantly influenced by education. Persons with secondary or higher education assessed quality of life in the above-mentioned domains more favourably compared to those with primary and vocational education. This relationship is confirmed by

studies by other authors [8, 9, 29]. Higher education enables a conscious approach to one's own life and health and healthy lifestyle choices, which translates into a more favourable quality of life and better health [30].

The study is not free of limitations. The study involved adults from one region – southwestern Poland. This area consists largely of lands recovered after World War II. In the immediate post-war years, there were numerous migrations of Poles to this area. Therefore, the level of quality of life of the respondents may be different from that of adults in Poland as a whole. In addition, the sample selection was not random. People volunteered to take part in the study. Therefore, we have an overrepresentation of people with secondary and higher education in the study group. Further research should include more people from different regions of Poland.

Conclusions

The quality of life of people aged 50-90 years from southwestern Poland is at a good level. Normal body weight and body fat distribution, as well as higher bone density and better respiratory function are conducive to a better quality of life. In order to be able to effectively implement measures to improve the quality of life of the adult and older adult population, further research is needed on the health status and quality of life in people from different regions of Poland.

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Ethical approval

Approval number: AWF Wrocław 2009, 2015.

Conflict of interest

The authors declare no conflict of interest.

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Address for correspondence

Antonina G. Kaczorowska

Institute of Health Sciences

University of Opole,

Poland

E-mail: antonina.kaczorowska@uni.opole.pl

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